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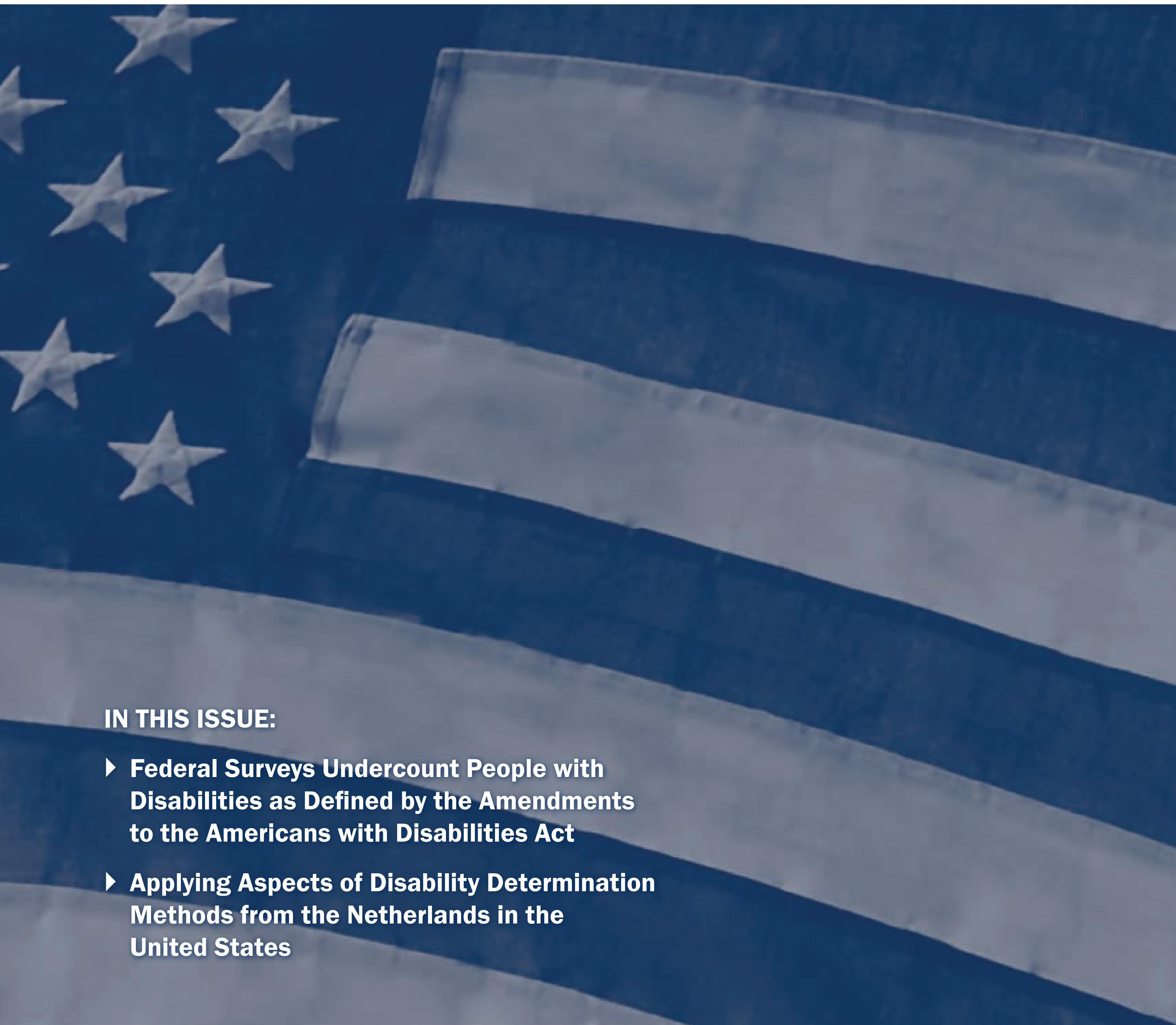

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Articles

Perspectives

Federal Surveys Undercount People with Disabilities as Defined by the Amendments to the Americans with Disabilities Act

by Hsinyu (Samuel) Tseng*

Disability measurement in federal surveys aligns with the Americans with Disabilities Act of 1990 (ADA) by focusing on major life activity limitations but has not evolved to align with the ADA Amendments Act of 2008, which expands the definition of major life activities to include major bodily functions. I find that people who ever had a major bodily function limitation were at least 30 percentage points less likely to be identified as having a disability, compared with people with major life activity limitations as defined before the amendments. The finding shows a disparity in disability identification in federal surveys. This disparity can be eliminated by expanding the scope of disability measurement to include major bodily function limitations. I quantify this expansion would increase the disability prevalence estimate among people aged 18–64 in the 2023 American Community Survey from 11 percent to roughly 27 percent, equivalent to 33 million additional people identified as having a disability.

Introduction

Disability can be defined and identified in multiple ways. Since 2008, several federal surveys, such as the American Community Survey (ACS), have used six yes-or-no questions (referred to as the ACS-6) to identify people having serious difficulty with hearing, vision, cognition, ambulation, self-care, or independent living. Respondents who answer "yes" to any ACS-6 are considered to have a disability (Bureau of Labor Statistics 2025). The ACS-6 set a minimum standard for survey questions on disability (Landes and others 2025) and are not designed to identify all people with disabilities (Bureau of Labor Statistics 2025).

The ACS-6 largely align with the definition of disability from the World Health Organization's International Classification of Functioning, Disability, and Health (ICF) (Brault 2009). At the same time, the ACS-6 aim to measure disability in accordance with the Americans with Disabilities Act of 1990 (ADA; Public Law 101-336), a federal civil rights law prohibiting discrimination against people with disabilities (Brault, Stern, and Raglin 2007). The ADA defines disability in three ways: (1) a physical or mental impairment that substantially limits one or more major life activities (MLAs), (2) a record of such an impairment, or (3) being regarded as having such an impairment.

The ADA does not require the federal government to measure disability in surveys, but the Census Bureau developed the ACS-6 to align with the ADA of 1990 because of an interest in assessing the effect of the ADA (Brault, Stern, and Raglin 2007). The ACS-6 have remained unchanged for almost two decades, even though the ADA was amended in 2008. The ADA Amendments Act of 2008 (ADAAA; Public Law 110-325) expands the definition of MLAs to include

Selected Abbreviations

ACS	American Community Survey
ADA	Americans with Disabilities Act of 1990
ADAAA	ADA Amendments Act of 2008
ICF	International Classification of Functioning, Disability, and Health
MDD	major depressive disorder

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Selected Abbreviations—*Continued*

MDE	major depressive episode
MEPS	Medical Expenditure Panel Survey
MLA	major life activity
NHIS	National Health Interview Survey
NSDUH	National Survey on Drug Use and Health

major bodily functions and provides a nonexhaustive list of MLAs (for example, seeing and working), including a nonexhaustive list of the operation of major bodily functions (for example, normal cell growth and endocrine functions).[1] Consequently, the ADA's definition of disability now includes physical or mental impairments that substantially limit the operation of one or more major bodily functions (hereafter, *major bodily function limitations*).

Because the ACS-6 have not adapted to the ADAAA, this article examines three fundamental questions about disability measurement:

1. To what degree do federal surveys identify people with major bodily function limitations as having a disability?
2. How does that compare with the rate at which the surveys identify people with impairments that substantially limit MLAs as defined before the ADAAA (hereafter, *MLA limitations*)?
3. By how much would disability prevalence estimates increase if the ACS-6 were expanded to include major bodily function limitations?

This article is the first to point out that the ACS-6 have not evolved to align with the ADAAA. It aims to inform a range of stakeholders of disability measurement (such as the disability community, policymakers, and researchers) about this misalignment and the extent to which it leads to undercounting people with ADA-defined disabilities.

I find that among people aged 18–64 who ever had major bodily function limitations—for the purpose of this article, people who ever had cancer, diabetes, epilepsy, or major depressive disorder (MDD)—less than 40 percent were identified by the ACS-6 as having a disability. This share was statistically significantly lower than the share of people with MLA limitations identified by the ACS-6 as having a disability. For these comparisons, I use data from the 2022 Medical Expenditure Panel Survey (MEPS), 2015 and 2017 National Health Interview Survey (NHIS), and 2020 National Survey on Drug Use and Health (NSDUH).

These findings show a disparity in disability identification in federal surveys: The ADA protects both people with major bodily function limitations and people with MLA limitations, but the former were identified as having a disability at a substantially lower rate than the latter. This disparity may prevent federal surveys, such as the ACS, from effectively serving as a resource for disabled people when resulting survey statistics are used to plan and fund government programs and services (Ross 2023). This disparity may adversely affect a federal agency's ability to publish disability regulations to protect people with disabilities because this disparity underestimates the number of people with disabilities based on the current ADA disability definition, which in turn could underassess the number of beneficiaries of a regulation and ultimately underestimate regulatory benefits. Disability statistics collected by federal surveys have been used to evaluate regulatory benefits and costs. To publish a regulation, a federal agency is required to show regulatory benefits outweigh costs. An example of disability regulations is the recently published final rule updating the regulation implementing Title II of the ADA to add more specific requirements about web and mobile application accessibility (Department of Justice 2024).

One way for federal surveys to address this disparity is to expand the scope of disability measurement to include major bodily function limitations. I quantify that if this scope were expanded to include cancer, diabetes, epilepsy, and MDD, the estimated disability prevalence among people aged 18–64 in the 2023 ACS would increase from 11 percent to roughly 27 percent, suggesting that 33 million additional people would be identified as having a disability. Comparable increases would be found in the MEPS, NHIS, and NSDUH.

It is important to note, though, what my study does not examine: the normative question of whether the ACS-6 *should* follow the expanded definition of major life activities in the ADAAA. Nevertheless, this article can serve as a technical reference in this examination. It is up to the Census Bureau, other federal agencies, and relevant stakeholders to consider whether or how the ACS-6 should be revised.

Literature Review

This article focuses on disability as defined by the ADA, although there are alternative definitions, including disability as defined by the Social Security

Disability Insurance and Supplemental Security Income programs (Social Security Administration 2012), the Nagi model summarized in Burkhauser and others (2002), and the ICF framework summarized in Burkhauser, Houtenville, and Tennant (2012). The Nagi model considers disability as a process in which an individual's illness interacts with the socioeconomic environment. Under the ICF framework, disability refers to the presence of an impairment, activity limitation, and/or participation restriction, based on a health condition.

The ACS-6 largely align with the ICF framework (Brault 2009) and aim to follow MLAs as defined before the ADAAA. This is because the ACS-6 do not focus on the presence of specific conditions but on the realized effects of such conditions.

Prior studies have examined the strengths and weaknesses of the ACS-6 (for example, Burkhauser, Houtenville, and Tennant 2012; Burkhauser and others 2014; Hall and others 2022; Karpman and Morriss 2024; Landes and others 2025; Weeks and others 2021). The Census Bureau recently proposed, then paused, revising the ACS-6 (Santos 2024). This proposal used the Washington Group Short Set on Functioning (WG-SS) to replace the ACS-6 (Steinweg and others 2023). The WG-SS differs from the ACS-6 because it includes a question about communication difficulty and uses graded responses, as opposed to yes-or-no responses in the ACS-6. The WG-SS matches the ICF framework and follows MLAs as defined before the ADAAA but does not consider major bodily function limitations.

This article contributes to the literature on the share of people with physical or mental health conditions identified by the ACS-6 as having a disability. For example, it shares the perspective of Hermans, Morriss, and Popkin (2024) that it is valuable to measure disability in a manner that better matches the ADA. It implements this perspective before their paper was published. This article complements Burkhauser, Houtenville, and Tennant (2012), who found that 45 percent of people with a work-activity limitation answered "no" to all ACS-6. Burkhauser and others (2014) found that 34 percent of people receiving Social Security Disability Insurance, Supplemental Security Income, or both answered "no" to all ACS-6.

Hall and others (2022) and Karpman and Morriss (2024) found up to 32 percent of people aged 18–64 with physical or mental health conditions were not identified by the ACS-6 as having a disability, while Landes and others (2025) reported a share of up to 25 percent for people aged 18 or older. These studies used their findings to advocate expanding the ACS-6 to improve the accuracy of disability prevalence estimates. However, these studies did not relate this issue to the expanded legislative definition of MLAs.

By contrast, I use the ADAAA's expanded definition of MLAs to measure disability. I find a substantially higher share, more than 60 percent, of people with major bodily function limitations were not identified as having a disability. This is at least partly because my analysis sample is more consistent with the current ADA disability definition. First, my analysis sample includes people with major bodily function limitations without requiring that these limitations affect daily activities; conversely, their analyses were restricted to people with physical or mental health conditions that affected daily activities, required the use of assistive equipment or devices, or both. This restriction deviated from the current ADA disability definition because impairments substantially limiting the operation of bodily functions are disabilities themselves, regardless of whether they substantially limit MLAs as defined before the ADAAA, require the use of assistive equipment or devices, or both.

Second, those studies focused on people who *currently* have a physical or mental health condition, but I mirror the ADA's coverage of people who have a record of disability by including people who *ever* had a major bodily function limitation. Some of these people do not currently have a limitation and may be more likely to answer "no" to all ACS-6.[2] Still, they are considered as having an ADA-defined disability.

Data and Methods

The population of interest for my study includes working-age individuals aged 18–64 to facilitate comparison with the findings of Hall and others (2022) and Karpman and Morriss (2024). I analyze major bodily function limitations by examining four conditions—cancer, diabetes, epilepsy, and MDD—listed as examples of major bodily function limitations in the federal regulation implementing the ADAAA of 2008 (Department of Justice 2016). These four conditions are chosen because their presence can be observed in three recent federal surveys listed in Table 1: the 2022 MEPS, 2015 and 2017 NHIS, and 2020 NSDUH. This approach allows identification of people who *ever* had cancer, diabetes, epilepsy, or a major depressive episode (MDE), which leads them to be considered as having a disability because they meet the first or second way of the ADA disability definition.

Table 1.
Summary of three federal surveys that include the ACS-6, major bodily function limitations, and MLA limitations

Attribute	MEPS	NHIS	NSDUH
Representativeness	National	National	National
Survey year	2022	2015 and 2017	2020
Data fields used in this study			
ACS-6	Yes	Yes	Yes
Major bodily function limitations	Cancer Diabetes	Cancer Diabetes Epilepsy	MDE
MLA limitations			
Difficulties caring for oneself, walking, seeing, and hearing	Yes (part of ACS-6)	Yes (part of ACS-6)	Yes (part of ACS-6)
Difficulties working and performing manual tasks	Yes	Yes	No
Demographics (sex, age, and race and ethnicity)	Yes	Yes	Yes

SOURCE: Author's summary of survey documentation.

NOTES: The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

ACS = American Community Survey; MDE = major depressive episode; MEPS = Medical Expenditure Panel Survey; MLA = major life activity; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health.

Likewise, I analyze MLA limitations by examining six activities—caring for oneself, walking, seeing, hearing, working, and performing manual tasks—listed as examples of MLA limitations in the federal regulation implementing the ADA of 1990 (Department of Justice 1991). These six activities are chosen because their presence can be observed in the surveys mentioned above (in fact, the first four are captured by the ACS-6). One caveat is that the surveys do not identify people who *ever* had MLA limitations, only people who *currently* have such limitations, which lead them to meet only the first way of the ADA disability definition.

I analyze the degree to which people who ever had one of the four major bodily function limitations answered "yes" to any ACS-6. I use within-survey mean comparison to contrast that rate with the rate from people who currently have one of the six MLA limitations. People with the first four MLA limitations were, by definition, fully identified by the ACS-6 as having a disability—their rate is 100 percent—because the ACS-6 capture those limitations. See Appendix A for additional data description and a justification for using MDE as a proxy for MDD.

I conduct a robustness check to assess the extent to which my findings would change if my analysis sample were restricted to people who *currently* have, rather than ever had, major bodily function limitations. An advantage to this restriction is that it allows direct comparison of answers from people with current major bodily function limitations to the answers of people with current MLA limitations. However, this restriction deviates from the ADA disability definition by excluding people with a record of a major bodily function limitation.

I perform single imputation using logistic regression to estimate by how much disability prevalence estimated by the ACS-6 would increase if the scope of disability measurement were expanded to include cancer, diabetes, epilepsy, and MDE. This imputation combines data from the MEPS, NHIS, NSDUH, and ACS and accounts for their survey design parameters (sampling weights, stratification, and clustering). Similar data combinations have been used in previous studies. For example, Ingram and others (2003) combined NHIS and Census Bureau data to predict the single race that best described respondents who reported multiple races in the 2000 Census. Schenker, Raghunathan, and Bondarenko (2010) combined data from the NHIS and the National Health and Nutrition Examination Survey to improve the accuracy of self-reported disease occurrence.

The final variable of interest is a binary variable indicating whether a respondent answered "yes" to any ACS-6, cancer, diabetes, epilepsy, or MDE. To create this variable, I follow medical literature and use data on cancer and diabetes from the MEPS and NHIS, epilepsy from the NHIS, and MDE from the NSDUH to impute disease occurrence for respondents in the other surveys that otherwise would lack such information. The analysis sample for imputation includes adults aged 18–64 who answered "no" to all ACS-6. I exclude from imputation people answering "yes" to any ACS-6 because it is already known that the final variable of interest should be coded "yes" for them.

All four surveys are nationally representative, so differences in demographics—sex, age, and race and ethnicity—across surveys are assumed, and empirically verified, to be small. Nevertheless, I adjust for demographic differences by (1) dividing respondents into blocks based on their demographic characteristics and (2) performing within-block logistic regression that controls for demographics. See Appendix B for details on the imputation, an empirical assessment of demographics, and a sensitivity analysis.

Results

Table 2 presents disability rates, estimated by the ACS-6, of civilian noninstitutionalized adults aged 18–64 from four surveys. The estimate is the lowest in the ACS (11.1 percent), followed by 11.2 percent in the MEPS and 14.4 percent in the NHIS, and is the highest in the NSDUH (16.2 percent). Despite this variability, these rates closely align with those previously published by other studies (for example, Mitra and others 2022). The Bureau of Labor Statistics (2025) suggests that this variability may be explained by survey differences in some attributes, such as survey context.

Table 3 shows how the ACS-6 were answered by people with major bodily function limitations (Panel A) and MLA limitations (Panel B), as well as the prevalence of each limitation. Among adults aged 18–64, approximately 13 percent were ever told by a health professional that they had cancer, diabetes, or epilepsy. Seventeen percent experienced at least one MDE in their lifetime. Between 8 percent and 11 percent had difficulties caring for oneself, walking, seeing, or hearing. For difficulties working or performing manual tasks, the share ranged from 7 percent to 13 percent.

Among adults aged 18–64 who ever had cancer, diabetes, or epilepsy, 34 percent answered "yes" to any ACS-6. For people who ever had an MDE, the share was 38 percent. These findings indicate that less than 40 percent of people with major bodily function limitations were identified by the ACS-6 as having a disability.

As mentioned earlier, 100 percent of people with difficulties caring for oneself, walking, seeing, or hearing answered "yes" to any ACS-6 because the ACS-6 capture these difficulties. Approximately 70 percent of people with difficulties working or performing manual tasks answered "yes" to any ACS-6. These two estimates indicate that at least 70 percent of people with MLA limitations were identified by the ACS-6 as having a disability.

Collectively, these results show a disparity in disability identification in federal surveys: While the ADA protects both people with major bodily function limitations and MLA limitations, the former were identified as having a disability at a substantially lower rate compared with the latter (less than 40 percent versus at least 70 percent). This difference is statistically significant (see Table 3 notes).

Table 2.
Share of adults aged 18–64 with disabilities as estimated by the ACS-6, by survey

Measure	ACS 2023	MEPS 2022	NHIS 2015 and 2017	NSDUH 2020
Share (%)	11.1	11.2	14.4	16.2
Sample size	1,946,501	12,628	22,355	24,186

SOURCE: Author's estimation based on ACS, MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

ACS = American Community Survey; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health.

Table 3.
Prevalence of selected major bodily function limitations and MLA limitations among adults aged 18–64 and how adults with these limitations responded to the ACS-6, by limitation and survey (in percent)

Limitation and survey	Prevalence	Share of answers to the ACS-6: "Yes" to any	Share of answers to the ACS-6: "No" to all
	Panel A: Major bodily function limitations		
Cancer, diabetes, or epilepsy			
NHIS 2015 and 2017	13.4	34	66
Cancer or diabetes			
MEPS 2022	12.2	25	75
NHIS 2015 and 2017	11.8	32	68
MDE			
NSDUH 2020	16.9	38	62
	Panel B: MLA limitations		
Difficulties caring for oneself, walking, seeing, or hearing			
MEPS 2022	7.8	[a] 100	[a] 0
NHIS 2015 and 2017	11.4	[a] 100	[a] 0
NSDUH 2020	9.5	[a] 100	[a] 0
Difficulties working or performing manual tasks [b]			
MEPS 2022	6.9	68	32
NHIS 2015 and 2017	12.9	69	31

SOURCE: Author's estimation based on MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

Within-survey mean comparison shows that the share of people with major bodily function limitations who answered "yes" to any ACS-6 is statistically significantly lower than the share for people with MLA limitations. For example, in the NHIS, the share of people with cancer, diabetes, or epilepsy answering "yes" to any ACS-6 is 35 percentage points lower than that of people with difficulties working or performing manual tasks, and this difference is statistically significant (p-value < 0.01).

In Table 2, the NSDUH displays a higher disability rate (measured by all of the ACS-6) than the NHIS (16.2 percent versus 14.4 percent). However, in this table, the NSDUH displays a lower rate (measured by four of the ACS-6) than the NHIS (9.5 percent versus 11.4 percent). A separate analysis of answers to each of the ACS-6 indicates that this discrepancy is because of the NSDUH's higher rate of cognitive difficulties, which are not part of the four difficulties included in this table.

ACS = American Community Survey; MDE = major depressive episode; MEPS = Medical Expenditure Panel Survey; MLA = major life activity; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health.

a. These four difficulties are captured by the ACS-6.

b. The MEPS and NHIS ask different questions about difficulties working. Although the MEPS and NHIS ask similar questions about difficulties performing manual tasks, their response options differ (see Appendix A for details).

A robustness check indicates that if the analysis sample were restricted to people who currently have (rather than ever had) major bodily function limitations, less than half would be identified as having a disability. This suggests that such a restriction would reduce—but not eliminate—the disparity in disability identification because the gap would still be greater than 20 percentage points ("at least 70 percent" minus "less than half"). The estimate of "less than half" is based on a separate analysis indicating that 49 percent of people who currently have an MDE answered "yes" to any ACS-6. This is an 11-percentage-point increase from individuals who ever had an MDE (49 percent versus 38 percent). I assume this 11-percentage-point increase holds for people with cancer, diabetes, or epilepsy, so among people currently with those conditions, 45 percent (34 percent + 11 percent) would answer "yes" to any ACS-6. The NSDUH identifies both people who ever had and currently have an MDE, but the MEPS and NHIS identify only people who ever had cancer, diabetes, or epilepsy.

Table 4 shows the extent to which disability prevalence estimates in federal surveys would increase if the scope of disability questions were expanded to include cancer, diabetes, epilepsy, and MDE. In

Table 4.
Survey and imputed estimates of the share of adults aged 18–64 with disabilities, by survey and the scope of disability questions (in percent)

Scope of disability questions	ACS 2023	MEPS 2022	NHIS 2015 and 2017	NSDUH 2020
			Panel A: Survey estimates	
Benchmark: ACS-6 only	11.1	11.2	14.4	16.2
ACS-6 plus cancer, diabetes, and epilepsy	--	--	23.3	--
ACS-6 plus cancer and diabetes	--	20.5	22.5	--
ACS-6 plus MDE	--	--	--	26.7
			Panel B: Imputed estimates	
ACS-6 plus cancer, diabetes, and epilepsy	20.9	21.3	[a] 23.3	26.1
ACS-6 plus MDE	22.2	21.6	25.7	[a] 26.7
ACS-6 plus cancer, diabetes, epilepsy, and MDE (all four)	27.1	30.8	33.5	35.6
Increase in share from benchmark to plus all four diseases	16.0	19.6	19.1	19.4
Additional people identified as having disabilities by including all four diseases (millions) [b]	32.5	39.7	38.7	39.4

SOURCE: Author's analysis based on ACS, MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

ACS = American Community Survey; MDE = major depressive episode; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health; -- = not available.

a. Survey estimate, not imputed.

b. Equals the estimated number of Americans aged 18–64 in the 2023 ACS (203 million) times the respective increase in share from the benchmark to plus all four diseases.

Panel A, the benchmark includes the ACS-6 only, so its disability prevalence estimates are the same as those in Table 2. The additional rows in Panel A report disability estimates if the scope were expanded to include diseases whose information is available in the surveys. For example, NHIS data show that the disability prevalence estimate would increase to 23.3 percent if cancer, diabetes, and epilepsy were included.

Panel B shows imputed results for three scope expansions. For instance, the imputed 2023 ACS data show that if all four diseases were included, the disability prevalence estimate would be 27.1 percent, an increase of 16.0 percentage points from the benchmark (27.1 percent − 11.1 percent). The 2023 ACS estimates that the number of Americans aged 18–64 is 203 million (Census Bureau n.d.); therefore, the number of additional people who would be considered as having a disability would be 32.5 million (203 × 0.16). A subgroup analysis indicates that the increase in disability prevalence estimate would be larger for women, people aged 50–64, and people who identify as non-Hispanic White.

When all four diseases were included, the increase in disability prevalence estimate varies across surveys by less than 4 percentage points (from 16.0 to 19.6), suggesting the increase is robust across surveys. Nevertheless, the imputed disability prevalence estimates should be interpreted as rough estimates because of three potential caveats: (1) portability, (2) model misspecification and comorbidity, and (3) invalid confidence interval.

The imputation assumes portability—a logistic regression fitted to data in one survey applies to data in another. Some evidence supports this assumption (for example, all four surveys are nationally representative, and the MEPS uses the NHIS respondent pool as its sampling frame), but some issues may challenge this assumption. For instance, survey context varies across the four surveys: the MEPS, NHIS, and NSDUH are health surveys, while the ACS provides detailed population and housing information. This variation may result in higher disease prevalence estimates in the health surveys (the MEPS, NHIS, and NSDUH) compared with those in the non-health survey (the ACS).

The Bureau of Labor Statistics (2025) suggests that respondents may be more likely to answer "yes" to disease occurrence questions that appear in health surveys than those in non-health surveys.

Additionally, the imputation may misspecify the relationship among the four diseases, leading to either an over- or underestimation of comorbidity—people who ever had cancer/diabetes/epilepsy and MDE—and subsequently to an under- or overestimation of disability prevalence when all four diseases were included. This is because the imputation aims to estimate the share of people in the union of three sets (cancer/diabetes, epilepsy, and MDE). Although the MEPS, NHIS, and NSDUH allow me to estimate the share in each set individually, no survey provides information on the extent to which these sets overlap. To mitigate this potential source of error, I use medical literature to guide model specification and divide respondents into blocks (see Appendix B for details).

In Table 4, when the scope includes the ACS-6 plus all four diseases, the ACS estimate is rounded down to 27.1 percent (from 27.146 percent), with a 95 percent confidence interval from 27.109 percent to 27.183 percent. This interval reflects the variability that would arise if the ACS drew a new sample on each replication, but the sample from the other three surveys (which influences the imputed values) remained fixed across replications. Some researchers may argue that we should be interested in replications where all surveys drew new samples on each replication, which would yield somewhat wider confidence intervals. Alternative methods are available for estimating the confidence interval, but they would likely yield qualitatively similar results.

Conclusion

This article is the first to highlight that the ACS-6 have not adapted to the ADAAA of 2008, which expands the definition of MLAs to include major bodily functions. I show that among people aged 18–64 who ever had major bodily function limitations, less than 40 percent were identified by the ACS-6 as having a disability, which is substantially lower than the share identified among people with MLA limitations. I further find that if the scope of the ACS-6 were expanded to include major bodily function limitations, the 2023 ACS disability prevalence estimate for people aged 18–64 would increase from 11 percent to roughly 27 percent.

Overall, these findings suggest that the ACS-6 only loosely align with the ADAAA. This is expected because the ACS-6 were developed before the ADAAA was enacted. The ACS-6 are not required to align with the ADA of 1990 or evolve to align with any amendments to the ADA.

If the ACS-6 were revised, they would be implemented in the context of the ADAAA, which remains one of the major laws protecting Americans with disabilities against discrimination. My findings prompt a question for stakeholders of disability measurement: If the ACS-6 were revised, what would be the socially optimal extent to which the revised ACS-6 measure disability using a framework aligning with the current ADA disability definition? The degree could range from zero (no alignment) to 100 percent (complete alignment). Full alignment is unlikely to be socially optimal because dozens of questions are required to identify all people with disabilities (Bureau of Labor Statistics 2025), but virtually no federal surveys can afford the time to administer that many questions. An ACS content test was conducted in 2022 to evaluate the recently proposed, then paused, ACS-6 revision (Santos 2024), and the content test's evaluation report (Steinweg and others 2023) makes no mention of measuring disability using a definition in keeping with the ADA. In fact, I could not find any discussion about the ADA in the 2023 report. It is up to the Census Bureau, other federal agencies, and their stakeholders to determine whether this change in the amount of discussion about the ADA is socially optimal.

Appendix A: Data Description

Table 1 lists the three nationally representative surveys used to analyze the degree to which people with major bodily function limitations—cancer, diabetes, epilepsy, or MDD—answered "yes" to any ACS-6, compared with people with MLA limitations—difficulties caring for oneself, walking, seeing, hearing, working, or performing manual tasks. The first four difficulties are captured by four questions in the ACS-6.

2022 MEPS

I use four data fields from the 2022 MEPS Household Component (HC): (1) the ACS-6, (2) cancer and diabetes, (3) difficulties working and performing manual tasks, and (4) demographics. I choose 2022 because, as of August 2025, it is the most recent year for which the MEPS HC full-year consolidated data file is available.

Cancer and diabetes are MEPS priority conditions, so respondents with cancer or diabetes are identified by a direct, dichotomous question for each condition, asking respondents whether they were ever told by a health professional that they had cancer or diabetes. I therefore classify people with major bodily function limitations in a dichotomous manner. The MEPS does not ask respondents whether they *currently* have cancer or diabetes.

Because epilepsy and MDD are not MEPS priority conditions, no direct question is available for these conditions. The MEPS medical conditions file collects information on a variety of conditions, including epilepsy and MDD, from respondents who mention a condition and receive treatment in the survey reference year. However, this collection is unlikely to yield nationally representative estimates of disease prevalence because it imposes the requirement of receiving treatment. As a result, I do not use information about epilepsy or MDD captured in the MEPS medical conditions file.

People with difficulties working are identified by two questions. The first is a dichotomous question asking respondents whether they are limited in any way in their ability to work at a job, do housework, or go to school because of an impairment or a physical or mental health problem. Those answering "yes" receive a follow-up question asking them to specify all activities (working at a job, doing housework, or going to school) limited by an impairment or health problem. These two questions allow me to classify people with difficulties working in the same dichotomous manner as those with major bodily function limitations.

People with difficulties performing manual tasks are identified by a question asking respondents how much difficulty they have using fingers to grasp or handle something, such as picking up a glass from a table or using a pencil to write. This question has four response options: (1) completely unable to do it, (2) a lot of difficulty, (3) some difficulty, and (4) no difficulty. I classify people choosing one of the first three options as having difficulties performing manual tasks. An alternative approach, classifying only those choosing one of the first two options, results in a lower prevalence of such difficulties but a higher share of individuals with such difficulties answering "yes" to any ACS-6.

2015 and 2017 NHIS

I use four NHIS data fields: (1) the ACS-6; (2) cancer, diabetes, and epilepsy; (3) difficulties working and performing manual tasks; and (4) demographics. People who ever had cancer, diabetes, or epilepsy are identified by the same direct, dichotomous questions as in the MEPS. The NHIS does not ask respondents whether they *currently* have cancer, diabetes, or epilepsy.

People with difficulties working are identified by a dichotomous question about limitations in the kind or amount of work they can do because of a physical, mental, or emotional problem. People with difficulties performing manual tasks are identified by a question asking how difficult it is for the respondent to use fingers to grasp or handle small objects without using any special equipment. This question has six response options: (1) can't do at all, (2) very difficult, (3) somewhat difficult, (4) only a little difficult, (5) not at all difficult, and (6) do not do this activity. I classify people choosing one of the first three options as having difficulties performing manual tasks, consistent with the MEPS approach.

I choose 2015 and 2017 because they are the two most recent years for which the NHIS included both the ACS-6 and a direct question about epilepsy. The ACS-6 were removed from the NHIS after 2017, and the direct question about epilepsy was not available in 2016. Combining the 2015 and 2017 datasets increases sample size, consistent with the practice of Weeks and others (2021). I restrict the analysis sample to adult respondents selected to answer the ACS-6 and questions about medical conditions, including cancer, diabetes, and epilepsy.

2020 NSDUH

I use three NSDUH data fields: (1) the ACS-6, (2) MDE, and (3) demographics. I choose 2020 because it is the most recent year for which the NSDUH included the ACS-6. The NSDUH does not have a direct question about MDD, instead using a series of questions to measure whether a respondent had experienced an MDE in their lifetime or in the past year. I classify respondents who experienced an MDE in their lifetime as those who ever had MDD, and respondents who had experienced an MDE in the past year as those who currently have MDD.

I use the MDE measurement as a proxy for MDD because the federal regulation implementing the ADAAA of 2008 (Department of Justice 2016) lists MDD as an example of major bodily function limitations, but the NSDUH measures only MDE. The MDE measurement can serve as a proxy for MDD because, according to personal correspondence with the Substance Abuse and Mental Health Services

Administration, the vast majority of MDE is MDD. It should be noted, though, that MDE includes episodes that occur as part of bipolar disorder, but MDD excludes bipolar depression. The NSDUH measures MDE, not MDD, because it cannot distinguish between MDE that occurs only in the context of depression and MDE that involves mania (bipolar depression). This is because the NSDUH does not ask about lifetime mania.

Information on difficulties working or performing manual tasks is not available in the NSDUH because it does not ask the former to all respondents aged 18–64 and does not have a question about the latter at all.

Demographics

Demographic variables common to all three surveys—sex, age, and race and ethnicity—are used to impute disease occurrence. Sex is a binary variable (women versus men) in all three surveys. Age is a continuous variable in the MEPS and NHIS, but in the NSDUH, it is a continuous variable only from 12 to 21 and a categorical variable from 22 to 64 (22–23, 24–25, 26–29, 30–34, 35–49, and 50–64). To reconcile this difference, I create three categorical variables for age: (1) a binary variable (18–49 and 50–64), (2) a three-category variable (18–25, 26–49, and 50–64), and (3) a six-category variable (18–21, 22–25, 26–29, 30–34, 35–49, and 50–64). As explained further in Appendix B, the first two variables are used to divide the analysis sample into demographic blocks, but the third is used as covariates in the logistic regression.

The MEPS and NHIS report race and ethnicity separately, but the NSDUH combines race and ethnicity into a seven-category variable. To adjust for this difference, I create two categorical variables for race and ethnicity: (1) a binary variable (non-Hispanic White and all other racial/ethnic identifications) and (2) a four-category variable (non-Hispanic White; non-Hispanic Black; non-Hispanic, all other races; and Hispanic, any race). Both variables are used to divide the analysis sample into demographic blocks, but the second is also used as covariates in the logistic regression.

Appendix B: Imputation

The imputation for my study comprises four stages:

1. Construct a range for the share of adults aged 18–64 who answered "no" to all ACS-6 but "yes" to cancer, diabetes, epilepsy, or MDE. Use this range to calculate a range for the mean of the final variable of interest, which serves as a reality check for the final imputed values.
2. Divide the analysis sample into demographic blocks and perform within-block regression controlling for demographic characteristics.
3. Use medical literature to inform the model specification of imputing disease occurrence.
4. Conduct a sensitivity analysis of four specifications with differing covariates to select the main specification.

Calculate a Range for the Mean of the Final Variable of Interest

No single survey collects information on all four diseases, so the collective prevalence of these four diseases is unknown. Nevertheless, I take three steps to calculate a range for the mean of the final variable of interest. First, I note that respondents whose final variable of interest is coded "yes" can be divided into two groups: (1) those answering "yes" to any ACS-6 and (2) those answering "no" to all ACS-6 but "yes" to disease occurrence questions—whether they were ever told by a health professional that they had cancer, diabetes, epilepsy, or MDE.

Second, I report in Table B-1 the share of people answering "no" to all ACS-6 but "yes" to disease occurrence questions. This table shows that 8.9 percent of civilian noninstitutionalized adults aged 18–64 answered "no" to all ACS-6 but "yes" to cancer, diabetes, or epilepsy. This share was 10.5 percent for MDE. I construct lower and upper bounds of the share of people who answered "no" to all ACS-6 but "yes" to cancer, diabetes, epilepsy, or MDE. The lower bound assumes a complete overlap between people belonging to the 8.9 percent and 10.5 percent, but the upper bound assumes no overlap. The lower bound is therefore 10.5 percent, but the upper bound is 19.4 percent (8.9 percent + 10.5 percent).

Third, I combine the estimated share of people answering "yes" to any ACS-6 with the lower and upper bounds of the share of people who answered "no" to all ACS-6 but "yes" to cancer, diabetes, epilepsy, or MDE. This combination creates a range for the mean of the final variable of interest. For example, in the 2023 ACS, 11.1 percent of people answered "yes" to any ACS-6, indicating that the mean of the final variable of interest in the 2023 ACS should be between 21.6 percent (11.1 percent + 10.5 percent) and 30.5 percent (11.1 percent + 19.4 percent).

Table B-1.
Share of adults aged 18–64 answering "no" to all ACS-6 but "yes" to disease occurrence questions, by survey (in percent)

Disease	MEPS 2022	NHIS 2015 and 2017	NSDUH 2020
Cancer, diabetes, or epilepsy	--	8.9	--
Cancer or diabetes	9.2	8.1	--
MDE	--	--	10.5

SOURCE: Author's estimation based on MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

The denominator of the estimates is the total number of civilian noninstitutionalized adults aged 18–64, and the numerator is the subset who answered "no" to all ACS-6 but "yes" to the respective disease occurrence questions. For example, in the MDE row, the numerator is the subset who answered "no" to all ACS-6 but "yes" to MDE.

ACS = American Community Survey; MDE = major depressive episode; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health; -- = not available.

Divide Analysis Sample Into Demographic Blocks

Table B-2 reports demographic characteristics of adults aged 18–64 answering “no” to all ACS-6. Their characteristics were similar across the ACS, MEPS, and NSDUH but differed slightly in the NHIS. For example, the NHIS reported a higher rate of people who identified as non-Hispanic White than the other three surveys.

Table B-3 shows the association between disease prevalence and demographic characteristics of adults aged 18–64 answering “no” to all ACS-6. Epilepsy was more common among people who identified as non-Hispanic White than among those who identified with other racial or ethnic groups. Cancer and diabetes were much more prevalent among people aged 50–64 than among younger age groups. MDE was more prevalent among women, adults aged 18–25, and people who identified as non-Hispanic White.

I divide the analysis sample into blocks based on demographics—sex, age, and race and ethnicity—and perform within-block logistic regressions controlling for demographics. This allows regression coefficients to vary by block, which can improve the adjustment for demographic differences across surveys. The number of blocks created for each disease depends on disease prevalence and how that prevalence varied by age. The number of blocks is as follows:

1. Four for epilepsy based on the binary age variable (18–49 and 50–64) and binary racial/ethnic variable (non-Hispanic White and all other racial/ethnic identifications).
2. Twenty each for cancer/diabetes and MDE based on the three-category age variable (18–25, 26–49, and 50–64), the binary sex variable (women and men), and the four-category racial/ethnic variable (non-Hispanic White; non-Hispanic Black; non-Hispanic, all other races; and Hispanic, any race). However, the binary racial/ethnic variable is used for two populations with low prevalence of specific disease (ages 18–25 with cancer/diabetes and ages 50–64 with MDE).

Use Medical Literature to Inform the Model Specification of Imputing Disease Occurrence

I impute three disease occurrence variables: cancer/diabetes, epilepsy, and MDE. I begin by imputing epilepsy occurrence because medical literature suggests that epilepsy may be a risk factor for cancer, diabetes, and MDE (for example, Adelöw and others 2006; Kanner and Balabanov 2002; Li and others 2021). This approach allows me to use epilepsy (both actual and imputed values) as a covariate when imputing the occurrences of cancer/diabetes and MDE.

Both the MEPS and NHIS provide information on cancer and diabetes, so the relationship between these two diseases is identified. I therefore impute a single disease occurrence variable—cancer/diabetes—indicating whether the respondent ever had cancer or diabetes, rather than imputing separate indicators, to avoid over- or underestimating their co-occurrence.

Table B-2.
Demographic characteristics of adults aged 18–64 answering "no" to all ACS-6, by survey (in percent)

Characteristic	ACS 2023	MEPS 2022	NHIS 2015 and 2017	NSDUH 2020
Sex				
Women	50	51	48	50
Men	50	49	52	50
Age group				
18–25	18	18	16	17
26–49	53	54	54	54
50–64	29	29	30	30
Race and ethnicity				
Non-Hispanic White	55	56	64	58
Non-Hispanic Black	12	13	13	13
Non-Hispanic, all other races [a]	12	11	8	9
Hispanic, any race	21	21	15	19

SOURCE: Author's estimation based on ACS, MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

Percentage distributions may not sum to 100 because of rounding.

ACS = American Community Survey; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health.

a. Other racial identification options vary by survey. For example, in the 2022 MEPS, other racial identification includes American Indian/Alaska Native (no other race), Asian/Native Hawaiian/Pacific Islander (no other race), and multiple races reported.

Table B-3.
Disease prevalence among adults aged 18–64 answering "no" to all ACS-6, by selected demographic characteristics (in percent)

Characteristic	Epilepsy	Cancer and diabetes	MDE
Data source	NHIS 2015 and 2017	MEPS 2022 and NHIS 2015 and 2017	NSDUH 2020
Sex			
Women	1.3	10.5	15.5
Men	0.9	9.8	9.7
Age group			
18–25	1.5	1.1	17.4
26–49	1.0	6.2	13.0
50–64	1.1	22.7	9.0
Race and ethnicity			
Non-Hispanic White	1.3	11.0	15.3
Non-Hispanic Black	1.0	10.4	8.1
Non-Hispanic, all other races [a]	0.7	7.8	9.3
Hispanic, any race	0.5	8.4	8.9

SOURCE: Author's estimation based on MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

ACS = American Community Survey; MDE = major depressive episode; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health.

a. Other racial identification options vary by survey. For example, in the 2022 MEPS, other racial identification inlcudes American Indian/Alaska Native (no other race), Asian/Native Hawaiian/Pacific Islander (no other race), and multiple races reported.

MDE data come from the NSDUH, so I impute a separate disease occurrence variable for MDE. The relationship between cancer/diabetes and MDE is not identified because information on cancer/diabetes and MDE is not provided by a single survey. Simultaneity may arise between cancer/diabetes and MDE because cancer and diabetes could be a risk factor for MDE, and vice versa (for example, Gillett and others 2024; Mallet and others 2018; Mössinger and Kostev 2023). However, I am not concerned about simultaneity here because my objective is just to impute missing data on disease occurrence, not to interpret regression coefficients.

I impute four specifications with differing covariates and show how the results vary as I change the covariates. I choose the specification that produces the most reasonable mean imputed values as the main specification and report those results in Table 4. The four specifications are:

A. Covariates include demographics[3] only.

B. Covariates include demographics and epilepsy.[4]

C. Covariates include demographics and epilepsy. Cancer/diabetes is added as a covariate when imputing MDE.

D. Covariates include demographics and epilepsy. MDE is added as a covariate when imputing cancer/diabetes.

After performing a logistic regression, I estimate predicted probability of disease occurrence for respondents who otherwise would not have disease occurrence information. I use the predicted probability and a random number generator to impute a dichotomous disease occurrence outcome for these respondents. For example, for respondents with a predicted probability of 0.6, I use a random number generator to impute a dichotomous outcome of 0 or 1 so that they have a 60 percent chance of getting a 1 and a 40 percent chance of getting a 0.

Use Sensitivity Analysis to Choose the Main Specification

Table B-4 presents results from the four specifications. This presentation serves as a sensitivity analysis, showing how results vary across specifications and aiding selection of the most suitable specification. Under every specification, the mean of the imputed key outcome—the share of people who would answer "yes" to any ACS-6, cancer, diabetes, epilepsy, or MDE—falls within the range presented earlier. The mean of the imputed key outcome varies little across specifications, suggesting robust results. For example, as noted earlier, the range for the mean of the imputed key outcome in the 2023 ACS is from 21.6 percent to 30.5 percent. Across the four specifications, the mean of the imputed key outcome in the 2023 ACS varies from 27.1 percent (in specification A) to 28.2 percent (in specification C).

Because all four specifications yield mean estimates near 27 percent, the selection of a main specification from the four specifications may not be crucial. This is because the potential over- or underestimation of comorbidity discussed below may lead to an under- or overestimation of the mean of the imputed key outcome that exceeds the difference in the mean estimates across the four specifications.[5] I therefore choose specification A, which produces the lowest estimate, as the main specification presented in Table 4.

As discussed in the Results section, the imputation may misspecify the relationship among the four diseases, resulting in an over- or underestimation of comorbidity—people who ever had cancer/diabetes/epilepsy and MDE—and consequently lead to an under- or overestimation of disability prevalence if the scope of disability measurement were expanded to include all four diseases.

On the one hand, it appears that in the ACS the imputation results in an overestimation of comorbidity and therefore leads to an underestimation of the key outcome's mean. The MEPS and ACS have nearly identical demographics (Table B-2), and their differences in the estimated disability prevalence in the first three rows of Table B-4 were less than 1 percentage point.[6] However, in the fourth row, the mean of the key outcome in the ACS was lower than that in the MEPS by more than 3 percentage points (27.1 percent versus 30.8 percent). One explanation for this larger gap is that ACS respondents were more likely to have comorbidity than MEPS respondents. However, a more plausible explanation is that this larger gap results from the imputation's overestimating comorbidity in the ACS, because virtually all MEPS data on cancer and diabetes come from survey responses, whereas all ACS disease occurrence data come from imputation.

On the other hand, the imputation relies on a conditional independence assumption (for example, the occurrence of cancer/diabetes is independent of that of MDE, conditional on demographics). It is suitable to make this assumption because no survey covers all four diseases, resulting in an unidentified relationship between the four diseases. However, if this assumption does not hold, the imputation may underestimate

Table B-4.
Benchmark survey estimates and imputation results from four model specifications: Share of adults aged 18–64 with disabilities, by survey, model specification, and scope of disability questions

Model specification and scope of disability questions	ACS 2023	MEPS 2022	NHIS 2015 and 2017	NSDUH 2020
Benchmark: ACS-6	[a] 11.1	[a] 11.2	[a] 14.4	[a] 16.2
Specification A: Covariates include demographics only				
ACS-6 plus cancer, diabetes, and epilepsy	20.9	21.3	[a] 23.3	26.1
ACS-6 plus MDE	22.2	21.6	25.7	[a] 26.7
ACS-6 plus cancer, diabetes, epilepsy, and MDE	27.1	30.8	33.5	35.6
Specification B: Covariates include demographics and epilepsy				
ACS-6 plus cancer, diabetes, and epilepsy	20.9	21.3	[a] 23.3	26.1
ACS-6 plus MDE	22.2	21.9	25.8	[a] 26.7
ACS-6 plus cancer, diabetes, epilepsy, and MDE	27.9	31.0	33.6	35.6
Specification C: Same covariates as specification B and add cancer/diabetes as a covariate for MDE				
ACS-6 plus cancer, diabetes, and epilepsy	20.9	21.3	[a] 23.3	26.1
ACS-6 plus MDE	22.0	22.2	25.9	[a] 26.7
ACS-6 plus cancer, diabetes, epilepsy, and MDE	28.2	31.3	33.7	35.6
Specification D: Same covariates as specification B and add MDE as a covariate for cancer/diabetes				
ACS-6 plus cancer, diabetes, and epilepsy	20.4	21.3	[a] 23.3	25.7
ACS-6 plus MDE	22.2	21.9	25.8	[a] 26.7
ACS-6 plus cancer, diabetes, epilepsy, and MDE	27.2	31.0	33.6	35.2

SOURCE: Author's analysis based on ACS, MEPS, NHIS, and NSDUH data.

NOTES: Estimates are weighted to reflect the U.S. civilian noninstitutionalized population aged 18–64.

The ACS-6 are six questions used in several federal surveys to identify people with disabilities.

ACS = American Community Survey; MDE = major depressive episode; MEPS = Medical Expenditure Panel Survey; NHIS = National Health Interview Survey; NSDUH = National Survey on Drug Use and Health.

a. Survey estimate, not imputed.

comorbidity, resulting in an overestimation of disability prevalence in the ACS.

I use the imputation of two disease occurrence variables—cancer/diabetes and MDE—in specification A to illustrate the potential underestimation of comorbidity. Similar discussions can apply to epilepsy and the other specifications. In specification A, only demographics are included as covariates. For the sake of discussion, I impute the occurrence of cancer/diabetes before that of MDE. As a result, the imputed values for cancer/diabetes are just a function of demographics plus some random noise. Because MDE is imputed after cancer/diabetes, the imputation evenly distributes the NSDUH's MDE occurrence—a 1 in MDE value—between people in the other three surveys with a 1 in their cancer/diabetes values and those with a 0 in their cancer/diabetes values. This even distribution is accurate if the occurrences of MDE and cancer/diabetes are conditionally independent, given demographics.

If, however, the occurrences of cancer/diabetes and MDE are positively correlated—people with cancer/diabetes are more likely to have MDE than other people with the same demographics—the imputation will underestimate comorbidity because it does not consider this correlation. This lack of consideration results in distributing too much MDE occurrence to people with a 0 in their cancer/diabetes values but too little to those with a 1 in their cancer/diabetes values. This leads to an overestimation of people who receive a 1 in these two variables and finally an overestimation of disability prevalence if the scope of disability measurement were expanded to include cancer, diabetes, and MDE.

Notes

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[1] Several important changes were made by the ADAAA, but this article focuses on the expanded definition of MLAs.

[2] A robustness check presented in the Results section suggests that, if my analysis sample were restricted to people who currently have major bodily function limitations, more than 50 percent of people with such limitations would not be identified as having a disability. Therefore, compared with the earlier studies, I still find a substantially higher share even under this restriction.

[3] See the Demographics subsection under Appendix A for details.

[4] Epilepsy is dropped as a covariate in some blocks because of collinearity.

[5] This difference in the mean estimates was at most 1.1 percentage points in the 2023 ACS (28.2 − 27.1).

[6] For example, the difference in the second row was 0.4 percentage point (21.3 − 20.9).

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Applying Aspects of Disability Determination Methods from the Netherlands in the United States

by Nicole Maestas, Kathleen J. Mullen, and Bastian Ravesteijn*

In contrast to the disability determination process in the United States, the Netherlands uses a unique method that directly measures an applicant's residual work capacity following the onset of a health condition. Standardized measures of functional abilities are linked to the requirements of actual jobs in the Netherlands, allowing for direct computation of a set of feasible jobs and the resulting estimated residual earnings capacity of an applicant, conditional on skills. In this article, we explain the measurement of work capacity in the Netherlands and then apply aspects of that method to estimate work capacity in a representative sample of U.S. working-age adults. We find that 11.8 percent of U.S. adults aged 18–65 have estimated earnings capacity below the substantial gainful activity threshold for U.S. Disability Insurance benefits. On average, compared with individuals with at least a bachelor's degree, individuals with less education have more functional limitations, a smaller set of feasible occupations, and lower estimated earnings capacity.

Introduction

In recent years, there has been policy debate about whether the disability determination process for federal Disability Insurance (DI) benefits in the United States should be revised to more accurately reflect the multidimensional relationship between individuals' functional abilities and the functional requirements of work in a modern economy (Institute of Medicine 2007; Brandt and others 2011; National Academies of Sciences, Engineering, and Medicine 2019, 2023). Moreover, some policymakers have expressed interest in incorporating aspects of other countries' disability insurance[1] programs into potential reforms of the U.S. system (Mitra 2009; Autor and Duggan 2010; Burkhauser and Daly 2011; Fultz 2015). The disability determination system in the Netherlands is one such potential model.

Under the Work and Income According to Labour Capacity Act (Wet werk en inkomen naar arbeidsvermogen, or WIA),[2] the Dutch employee insurance agency (Uitvoeringsinstituut Werknemersverzekeringen, or UWV) uses a direct method of measuring an applicant's residual work capacity following the onset of a health condition. The assessment focuses first on identifying specific residual functional abilities. These standardized functional abilities are then directly linked to standardized requirements of existing jobs in the Netherlands, allowing direct

Selected Abbreviations

DI	Disability Insurance (U.S. program)
FML	Functional Abilities Questionnaire (Functionele Mogelijkheden Lijst)
HFCS	Health and Functional Capacity Survey
SD	standard deviation
SGA	substantial gainful activity

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Selected Abbreviations—*Continued*

SSA	Social Security Administration
SSI	Supplemental Security Income
UWV	Dutch employee insurance agency (Uitvoeringsinstituut Werknemersverzekeringen)
WIA	Work and Income According to Labour Capacity Act (Wet werk en inkomen naar arbeidsvermogen)

computation of a set of feasible jobs (that is, those jobs that an individual has the functional ability to perform) and the associated *residual earnings capacity* of an applicant, conditional on educational attainment. Next, the assessor calculates the estimated degree of *disability-related loss in earnings capacity*, defined as one minus the ratio of estimated residual earnings capacity to prior earnings. This degree of work incapacity is used to determine eligibility for WIA benefits, which can be received as full benefits or as partial benefits combined with part-time work.

By contrast, DI applicants in the United States are deemed to have no work capacity if they have one or more specific health conditions or if they fall into certain categories under medical-vocational guidelines based on age, education, prior work experience, and an aggregate measure of residual functional capacity. The DI guidelines were originally intended to identify as disabled only those applicants with minimal remaining capacity for physically demanding work, who had limited job prospects because of their low education, narrow skills, or advanced age. However, the guidelines have not been substantially modified since 1978 and have only ever comprised a coarse mapping between health status and alternative job prospects (Maestas 2019).

The goal of our study is to explain how work capacity is measured in the Netherlands and then to apply aspects of that method to estimate work capacity in a representative survey sample of U.S. adults aged 18–65, the population generally covered under the DI program.[3] We adapt the Dutch assessment tool to measure functional abilities in the U.S. sample and then apply the Dutch algorithm that matches individuals' functional abilities to occupational requirements of actual jobs in the Netherlands. We explore the sensitivity of the methodology to different assumptions about which job profiles are deemed feasible based on individuals' functional abilities and educational credentials, as well as assumptions about how feasible job profiles are used to calculate estimated earnings capacity. We perform a decomposition exercise in which we simulate estimated earnings capacity at three different education levels to examine the relative importance of educational attainment versus functional abilities as determinants of estimated earnings capacity. Finally, we compare the characteristics of individuals identified by the Dutch method as having low earnings capacity with those of current DI and Supplemental Security Income (SSI) beneficiaries in our sample.

We find that 11.8 percent of U.S. adults aged 18–65 have estimated earnings capacity below the substantial gainful activity (SGA) threshold defined by the U.S. Social Security Administration (SSA). Among those unable to perform SGA, most (72.5 percent, or 8.5 percent of the full sample) have zero estimated earnings capacity. By comparison, 5.4 percent of our sample report receiving DI benefits or SSI. Earnings capacity is positively associated with educational attainment: among individuals with less than a high school diploma, 28.5 percent have estimated earnings capacity below SGA, compared with 15.5 percent of high school graduates and 2.1 percent of college graduates.

These findings are robust to several different assumptions about how individuals from our sample are matched to feasible job profiles and how these job profiles are combined to estimate earnings capacity. The assumption that most affects estimated disability prevalence is the treatment of functional ability requirements flagged by the Dutch algorithm. The algorithm produces a flag when additional information is needed to evaluate whether an individual meets a functional ability requirement for a given job profile. In actual Dutch disability determinations, disability assessors resolve flags using information from an individual's medical records or from a structured interview with the applicant. Because we are unable to mimic this part of the Dutch process, we estimate upper and lower bounds on earnings capacity by either accepting all job profiles with flagged requirements (our baseline specification) or rejecting all such job profiles. Rejecting job profiles with flagged requirements results in 25.3 percent of the sample being identified as having earnings capacity below SGA (compared with 11.8 percent when accepting all job profiles with flagged requirements) and 23.1 percent of the sample identified as having zero earnings capacity (compared with 8.5 percent when accepting all such job profiles).

Our data and methodology allow us to simulate potential earnings under hypothetical conditions, including changes in individuals' educational credentials or functional abilities. We find that, when comparing high school graduates and college graduates, having a college degree has a larger effect on potential earnings than the difference in average functional abilities between the groups. By contrast, when comparing potential earnings for people with and without at least a high school education, the difference in average functional abilities matters about as much as having a diploma (or equivalent).

Finally, within our sample, we compare characteristics of current DI and SSI beneficiaries with those of individuals identified by the Dutch method as having low earnings capacity. We find that individuals with low earnings capacity report fewer health conditions but more functional limitations than DI and SSI beneficiaries report. The two groups have similar employment rates and educational distributions, but they differ markedly in age—specifically, individuals identified as having low earnings capacity tend to be much younger than DI and SSI beneficiaries.

This article contributes to the literature on disability insurance systems around the world (Wise 2017). The Dutch system—which, among other distinctions, requires employers to bear some of the costs of disability claims—has notably been proposed as a model for other countries, including the United States (Autor and Duggan 2010; Burkhauser and Daly 2011; Fultz 2015; Koning and Lindeboom 2015). Although there are important structural differences between the disability insurance systems in the Netherlands and the United States, both experienced rapid caseload growth during the 20th century, raising broad concerns about long-run sustainability. The Netherlands achieved a substantial reduction in its disability insurance caseload following a series of reforms. The U.S. caseload has also fallen, but for different reasons (Maestas, Mullen, and Strand 2021; Hoynes, Maestas, and Strand 2022).

This article focuses on the process for determining eligibility for disability insurance benefits. The Dutch method of direct disability assessment is widely regarded as an international best practice for rigorously measuring work capacity (Bolderson, Mabbett, and Hvinden 2002; Wright and de Boer 2002; Bickenbach and others 2015; Geiger and others 2018). Whereas other studies primarily survey and critique varying approaches to disability assessment, we go a step further by applying aspects of the Dutch disability determination process—specifically, the algorithm used to identify feasible job profiles based on applicants' functional abilities—to a representative sample of U.S. adults aged 18–65.

There are significant advantages to our approach. Although the Netherlands uses a relative disability standard (earnings loss relative to prior earnings) while the United States uses an absolute disability standard (income below the SGA threshold), modeling the Dutch system using U.S. data allows calculation of alternative outcomes or implementation of other standards because the model produces counterfactual estimates using comparisons of individuals' functional abilities to harmonized measures of occupational requirements for a set of jobs characterized by wages and other requirements (such as hours and education). As a result, this approach allows calculation of individual work capacity and comparison against the absolute SGA standard in the United States. Furthermore, understanding the explicit link between functional abilities and occupational requirements can provide valuable information for other uses, such as for SSA's work incentive programs and state vocational rehabilitation services, because it identifies specific jobs an individual may be capable of performing.

We believe there are valuable lessons to be learned from evaluating U.S. workers against job requirements in the Dutch economy. Two prior studies compare job information across multiple countries, including the United States, and find that job requirements are broadly similar across countries despite substantial cultural and size differences. Taylor and others (2008) compare data from the Occupational Information Network (O*NET) Generalized Work Activities, Basic and Cross-Functional Skills, and Work Style survey instruments in China, Hong Kong, New Zealand, and the United States, concluding that "job information is likely to transport quite well across countries." Similarly, Ryan and Sinning (2011) compare literacy skills in Australia, Canada, New Zealand, and the United States and "find the broad match of workers with skills to jobs that use them to be quite similar" across the four countries. Although the U.S. workforce is nearly 17 times larger than the Dutch workforce (164.5 million U.S. workers in 2022 versus 9.8 million Dutch workers in 2020), their industry breakdowns are quite similar. In the Netherlands in 2020, 16.6 percent of all jobs were in goods production (for example, manufacturing, construction, agriculture); 56.2 percent were in commercial services; and 27.2 percent were in public services, including health care, welfare, education, public administration, and government (Statistics Netherlands 2022). In the United States in 2022, the corresponding shares were 14.1 percent, 57.7 percent, and 28.2 percent (Bureau of Labor Statistics 2023a).

It is important to note that the goal of this article is to consider aspects of the Dutch disability determination process but not to advocate for the wholesale adoption of the Dutch disability insurance system in the United States. Addressing aspects of the disability insurance system unrelated to disability determination is outside the scope of this article.

Background

This section explores the disability insurance programs in the United States and the Netherlands, highlighting both their operational parallels and their distinct approaches to disability determination.

Similarities and Differences Between the U.S. and Dutch Contexts

There are many similarities between how the United States and the Netherlands insure workers' earnings against the risk of experiencing a career-ending disability, as well as some notable differences. Both countries have public disability insurance for people with sufficient prior work experience—DI in the United States, and WIA benefits[4] in the Netherlands—and for people with limited or no prior work experience—SSI in the United States, and Invalidity Insurance Act (Young Disabled Persons) (Wet arbeidsongeschiktheidsvoorziening jonggehandicapten, or Wajong) benefits in the Netherlands. Both U.S. programs use the same disability determination process based on medical-vocational criteria. In the Netherlands, the Wajong program uses a simplified four-item checklist to assess disability (that is, whether the applicant can execute a task in a work environment, follow through on commitments, work at least 1 hour without interruption, and work at least 4 hours per day), while WIA programs use the procedure described in the next section.

In the United States, DI benefits totaled about $143 billion in 2022—less than 1 percent of gross domestic product (GDP) (Center on Budget and Policy Priorities 2023). In October 2023, there were approximately 7.4 million disabled-worker beneficiaries in current-payment status in the United States, or about 3.7 percent of the population aged 18–64 (Bureau of Labor Statistics 2023b). Half of the disabled-worker beneficiaries in the United States in 2022 were men, and two-thirds were age 55 or older (SSA 2023).

In the Netherlands, total spending on DI-equivalent benefits was €12.3 billion in 2020 (UWV 2021), or about 1.5 percent of GDP. Approximately 564,000 individuals, or 5.3 percent of the Dutch working-age population, received the Dutch equivalent of DI benefits. About 46 percent were men and 56.5 percent were age 55 or older (Statistics Netherlands 2024).

There are some differences in how disability insurance claimants enter and progress through the application process in the United States versus the Netherlands. The DI program has a 5-month waiting period beginning from disability onset, whereas, since 2002, the Netherlands requires a 2-year waiting period during which the applicant usually receives temporary sickness payments and the applicant's employer is obligated to implement a return-to-work plan (Koning and Lindeboom 2015).[5] Unlike U.S. employers, who pay a single DI contribution rate, Dutch employers are incentivized to limit disability insurance inflows because their program premiums are affected by experience ratings (measures of past benefit costs for their workers). Because experience ratings affect their future expenses, Dutch employers can appeal disability determinations favorable to workers or request later reassessments to determine whether workers have recovered to some extent. In practice, Dutch employers do not appeal determinations for workers found to be fully and permanently disabled with no prospect of improvement (that is, those with no "durable capabilities for work") because such cases do not contribute to employer experience ratings. As is the case in the United States, individual applicants in the Netherlands can also object to their determination if they think a mistake was made, and if they disagree with the UWV response to their objection, they can appeal the determination in court.

Both countries use a two-part process that effectively triages the most severe cases based on medical criteria alone. The United States does so by determining whether applicants have one or more specified health conditions that automatically qualify them for benefits. The Netherlands uses a five-item screener to automatically award benefits to individuals who have no "durable capabilities for work."

Most relevant to the current study is how the two countries define disability. In the United States, the disability standard is the same for all adults: whether the applicant is unable to engage in SGA, which is operationalized as an annually updated monetary threshold ($1,470 per month in 2023 for nonblind individuals) that differs only by blind or nonblind status. By contrast, the Dutch programs insure against *earnings loss* caused by health deterioration, therefore eligibility is relative to the individual's earnings before disability onset. In the United States, only those individuals assessed as completely unable to perform SGA are eligible for DI benefits, whereas in the Netherlands, individuals are eligible for partial or full WIA benefits depending on the extent of their health-related loss in earnings capacity. Because eligibility for full or partial WIA benefits depends on Dutch applicants' prior earnings, the disability determination procedure focuses on estimating applicants' current (post-onset) earnings capacity rather than using a binary indicator of disability set at fixed level, such as the U.S. SGA threshold. Importantly, there is nothing about the U.S. definition of disability that precludes using the Dutch method to ascertain whether an applicant's potential earnings capacity is above or below the SGA threshold. The assessment of individual earnings capacity is our focus in this article.

Though both countries conceptually relate applicants' functional abilities to job requirements in the national economy to determine disability status, the United States does so using more aggregated measures than the Dutch use. Specifically, for nonexpedited cases, the U.S. procedure sorts applicants into one of five broad levels of residual functional capacity (RFC) (that is, the ability to do exertional work that is sedentary, light, medium, heavy, or very heavy) and then applies medical-vocational guidelines (often called the "grid") that determine disability status based on combinations of RFC, age, education, and type of skills gained in prior work experience. The guidance for these medical-vocational determinations was first published in 1979 in Appendix 2 to Subpart P of Part 404 in Title 20 of the Code of Federal Regulations, with only a few minor updates in 1991, 2003, 2008 and 2020. For example, the last update in 2020 removed inability to communicate in English as an education category, and the previous update in 2008 revised the definition of "closely approaching retirement age" from "60–64" to "60 or older" to reflect changes in the Social Security full retirement age.

Additionally, the U.S. Dictionary of Occupational Titles, which underpins the medical-vocational grid rules used to determine disability, has not been updated since 1991. In response to widespread concerns about using outdated job requirements to make disability determinations, SSA entered into an interagency agreement with the Bureau of Labor Statistics in 2012 to develop a modern national database of job requirements, called the Occupational Requirements Survey (ORS) (SSA n.d.). In 2022, the agencies collaborated on a survey redesign based on findings from the first and second waves of data collection (published in 2019 and 2022, respectively). In 2023, the Office of Management and Budget approved a third wave of data collection, but the ORS has yet to be incorporated into SSA procedures. By contrast, the Dutch job profile database used to support disability determinations is updated regularly.

Relevant Aspects of the Dutch Disability Determination Process

WIA applications for individuals with recent work history in the Netherlands are processed by the UWV after 2 years of uninterrupted (partial) sickness absence. During these 2 years, mandatory sick pay is paid by the employer for the remainder of the employment contract and by a public short-term disability scheme thereafter. The employer must also implement an individualized return-to-work plan. If, after 2 years, the individual is still unable to work, they may apply for WIA benefits. Benefit eligibility depends on the applicant's degree of *disability-related loss in earnings capacity*, defined as one minus the ratio of the applicant's estimated *residual earnings capacity* (calculated using the procedure outlined below) to his or her actual earnings prior to disability onset. An estimated earnings loss of less than 35 percent disqualifies the applicant for disability benefits. A loss from 35 percent to less than 80 percent qualifies the applicant for partial WIA benefits, and a loss of at least 80 percent entitles the applicant to full WIA benefits as long as medical improvement is not expected. In 2020, the UWV received 64,458 applications for WIA benefits; of these, 32 percent resulted in no benefits awarded, 17 percent were awarded partial benefits, and 51 percent were awarded full benefits (UWV 2021).

An applicant's residual earnings capacity is defined by the highest-earning *job profiles* for which the applicant's abilities and skills meet all requirements. These job profiles describe the age,[6] education, experience, and functional ability requirements as well as tasks and earnings of actual jobs in the Netherlands. The UWV maintains a database of approximately 5,500 job profiles (described in more detail in the Data section), which are unique in their duties and characteristics and can be aggregated into nearly 300 *occupations* (approximately equivalent to the four-digit level of Standard Occupation Classification in the

United States) defined by up to three *generalized tasks* ("werktypes"). Each job profile can include multiple positions (workers who do the same job with the exact same characteristics at the same employer). Job profiles are "active," meaning they are used for disability determination, if they relate to an occupation that currently exists in all five regions of the country.

Chart 1 summarizes how two types of UWV specialists—a *physician* with specialized training in insurance medicine and a *disability assessor* who has a specialized nonmedical postgraduate degree—collaborate to determine an applicant's residual earnings capacity. First, the physician records up to three health conditions, starting with the diagnoses most responsible for the limitation of the applicant's productive capacities. Next, the physician immediately deems "fully disabled" those applicants with no "durable capabilities for work." These are applicants who meet any of the following conditions: (1) are severely limited in their ability to function at a personal or social level because of a mental disorder; (2) reside in a long-term care facility; (3) are currently, and expected to continue to be, bedridden for most of the day; (4) are highly dependent in activities of daily living (ADL) and require assistance from another person for basic functions of normal life; or (5) have highly fluctuating capabilities, are expected to lose ADL independence within 3 months, or are expected to die within 1 year. These applicants are automatically eligible for full WIA benefits. In 2010, 23 percent of individuals awarded WIA benefits met one of these five criteria and therefore did not receive a review by a disability assessor; of those, 24 percent had severe problems with personal or social functioning; 21 percent resided in a long-term care facility; 3 percent were bedridden; 8 percent were ADL dependent; and 44 percent had highly fluctuating capacities or were expected to lose ADL independence or die soon (de Jong, Everhardt, and Schrijvershof 2013).

For the remaining applicants, the physician completes a standardized Functional Abilities Questionnaire (Functionele Mogelijkheden Lijst, or FML) based on a review of the applicant's medical records and a 1-hour interview with the applicant (but not a physical examination). Functional abilities are measured using binary, ordinal, or check-all-that-apply scales. If an applicant's actual ability falls between two levels of an ordinal scale, the physician is expected to assign the lower capacity and note the actual level with an open-ended remark.

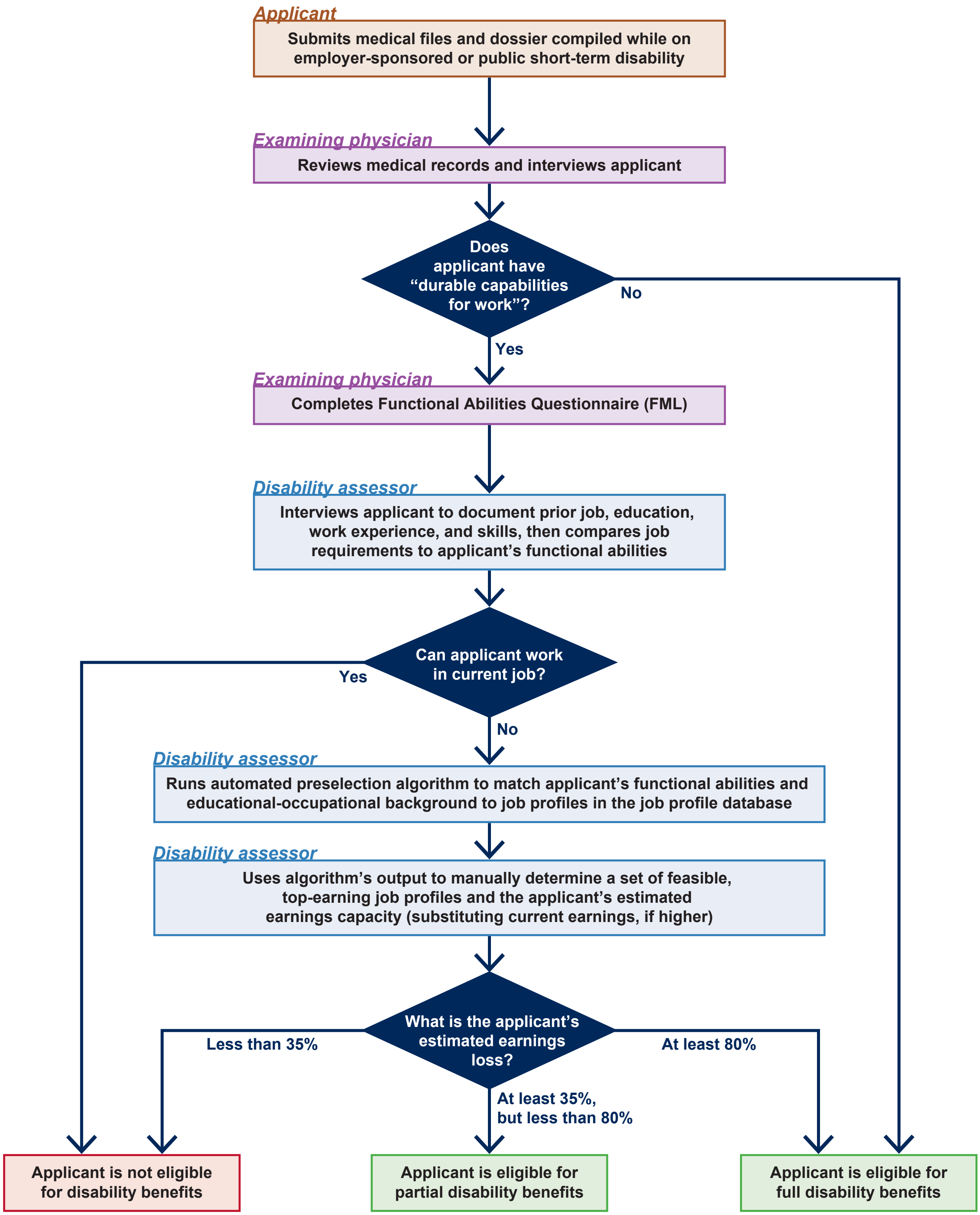
Next, the physician transmits the FML responses and overall conclusions to the second UWV specialist, the disability assessor. Assessors are not medical professionals and do not receive information about medical diagnoses. Instead, the disability assessor collects from the applicant key information—job prior to disability onset (that is, the last job held), education, work experience, and skills—and uses this information, along with the FML responses, to determine the applicant's work capacity. The assessor first evaluates whether the applicant can perform the last job held for the same number of hours per week. If so, the applicant is not eligible for WIA benefits because there is no loss in earnings capacity. For jobs with unfamiliar requirements (that is, jobs that do not correspond to a job profile in the UWV database), the assessor will investigate the job's requirements, possibly visiting the applicant's former workplace in person.

If the applicant is not capable of performing the last job held, the disability assessor enters the applicant's educational credentials into the UWV system, which then classifies the education into one of seven aggregated levels. The disability assessor can also select a field of education from a list of seven options: administration, agriculture, art and culture, commercial, health care, services, and technical. If no field is selected, the UWV system assumes the field is "general." The disability assessor also records the applicant's language skills, possession of a driver's license, typing skills, computer skills, any experience with text processing, and full employment history (including employers and periods).

Next, the disability assessor runs an *automated preselection algorithm* that accepts, flags, or rejects job profiles in the database by comparing each job profile's functional ability and educational requirements to the applicant's specific functional abilities and educational credentials. The functional abilities of applicants and the functional requirements of jobs measure the same underlying constructs, and UWV manuals define in detail how abilities and requirements are measured (UWV 2013). Appendix Table A-1 outlines the relationship between the functional abilities and job requirements used in the algorithm.

Chart 2 represents how ability levels and job requirements are compared to determine whether applicants have the ability to perform an example requirement—collaboration with others—measured on corresponding three-value ordinal scales for both

Chart 1.
Overview of the Dutch disability determination process



SOURCE: Authors' schematic of process as described in UWV (2013).

Chart 2.
Example job profile evaluation matrix: Collaboration job requirement to functional ability

		Job Requirement 53: Collaboration		
		Not required	Required, but with own defined subtasks	Joint contribution in interaction with others
Functional Ability 2.9: Collab-oration	Normal, no difficulties working in teams	*Accept*	*Accept*	*Accept*
	Limited, can work in teams only if tasks are clearly mine	*Accept*	*Accept*	*Flag*
	Very limited, unable to work in teams	*Accept*	*Flag*	*Reject*

SOURCE: Adapted from UWV (2013).

ability level and requirement. As shown, for applicants with "very limited" collaboration ability, the algorithm *rejects* all job profiles requiring "joint contribution in interaction with others," *flags* any job profiles requiring collaboration "but with own defined subtasks," and *accepts* job profiles for which no level of collaboration is required. Flags are intended to trigger a manual review by the disability assessor to confirm that the applicant can meet the requirements, and a written explanation is required for the selection of any job profiles with flagged requirements.

Finally, the automated preselection algorithm produces a preliminary list of job profiles for which all functional and educational requirements are met by the applicant, grouped by occupation and ranked by the hourly wage of the median selected job profile within each occupation. The ranking excludes occupations with fewer than three positions across all selected job profiles. The disability assessor verifies that the applicant possesses all required functional abilities and educational credentials of the preselected job profiles and removes any job profiles for which this is not the case. For certain jobs, the employer may require that the employee obtain additional education within a specified period after starting the job; the job profile is considered acceptable only if the disability assessor can demonstrate that the applicant is capable of obtaining that additional education within the required period, based on prior training and skills.

An applicant's residual earnings capacity is then calculated as the product of *estimated hourly earnings capacity* and *weekly work hours capacity,* derived from the job profiles selected by the disability assessor. An applicant's hourly earnings capacity is estimated using the median hourly wage of the second-highest-earning *occupation* among the selected job profiles. To determine an applicant's estimated weekly work hours capacity, each occupation is assigned the highest weekly working hours across all selected job profiles within that occupation, and the applicant is assigned the lowest number of weekly working hours across all selected occupations, capped at the working hours of the last job held (because WIA applicants are not expected to work more hours than in their previous job). Note that residual earnings capacity is replaced by current earnings if the applicant is currently working and earning more than the estimated residual earnings capacity. Furthermore, an applicant's residual earnings capacity is zero if fewer than three occupations are represented among the job profiles selected by the disability assessor from the list of preselected job profiles.

Finally, one minus the ratio of estimated residual earnings capacity to prior earnings then determines the estimated degree of disability-related loss in earnings capacity, and therefore whether the applicant qualifies for partial or full WIA benefits and, if awarded partial benefits, the corresponding benefit level.

Data on Functional Abilities and Occupational Requirements

In this article, we use U.S. data on functional abilities in combination with Dutch data on job requirements to estimate work capacity using an algorithm based on the Dutch disability determination procedure. To illustrate how the Dutch earnings capacity determination process works when applied to a random sample of U.S. working-age adults, we use two data sources. The first is individual-level data on functional abilities obtained by fielding an adapted version of the FML to the nationally representative RAND American Life Panel. The second is administrative job profile data provided by the UWV. We describe each database in turn below.

The Dutch FML in the RAND American Life Panel

The FML is a standardized instrument used by the UWV to record the functional ability levels of WIA applicants for the purpose of determining their residual earnings capacity. The FML measures functional abilities that include tolerance for ambient environment; movements of arm, body, hand and finger, head and neck, and knee; mobility; pace; sitting and standing; upper body strength and torso range of motion; immune system; memory, attention, and cognition; sensory abilities; social skills and emotional regulation; and verbal and written communications. The FML was developed in 2002 to address concerns about the reliability and validity of earlier assessment methods (UWV 2003). In contrast to subjective assessments of general work ability, like that used in the United States and other countries, the FML quantifies work capacity by linking applicant capabilities to actual job requirements in the national economy. A hallmark of the method is that FML item scales correspond to the scales used to rate job profiles.

In April 2019, we invited 3,396 English-speaking participants in the RAND American Life Panel (ALP) to complete the FML, adapted for self-administration over the internet and translated to English, as a survey entitled the Health and Functional Capacity Survey (HFCS; ALP survey module 522) (RAND Corporation 2019). The ALP is a nationally representative (when weighted) sample of U.S. adults aged 18 or older who have agreed to participate in regular online social science surveys. To ensure the respondent sample is representative of all U.S. adults, including individuals with functional limitations, panel members are recruited using a variety of methods (such as mail, telephone, and in-person contact) and provided a tablet computer and internet subscription, if needed. All ALP surveys are accessible for people with disabilities (Section 508 compliant and meeting Web Content Accessibility Guidelines). The panel is refreshed periodically by recruiting new members (Pollard and Baird 2017). All surveys become publicly available and can be linked to one another using a pseudonymized respondent ID.[7]

The HFCS was completed by 2,657 panelists, a completion rate of 78 percent, which is similar to completion rates achieved in other ALP surveys. The HFCS began with screening questions corresponding to the five conditions under which WIA applicants in the Netherlands are automatically eligible for full benefits and are therefore excluded from the FML assessment (see previous section). We screened out 196 respondents and then administered the complete FML to the remaining participants. Chart 3 displays a screenshot of an HFCS question, adapted from the FML, about ability to hold head positions. In this

Chart 3.
Sample HFCS question: Ability to hold head positions

Do you have any difficulties with **holding your head** in **a specific position** (either tilted up/down/sideways by at least 15 degrees, or rotated to the side by 30 degrees)? Please tell us the total amount of time in an 8-hour working day you can spend in this position, allowing for breaks.

Definitions of head movements are:
Flexing up: looking up towards the sky
Flexing down: looking down towards the ground
Flexing to the side: tilting head to the side
Rotating to the side: looking over your shoulder

For illustration, the **left** figure shows a person **flexing his neck up and down**. The **middle** figure shows a person **flexing his neck to the side**. The **right** figure shows a person **rotating his head sideways**.

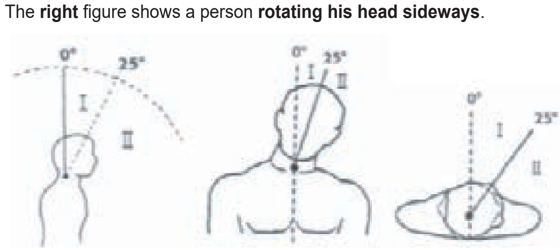


Image source: Peerenboom and Huysmans (2002)

- I can keep my head in a specific position for most of an 8-hour working day
- I can keep my head in a specific position for up to 4 hours
- I can keep my head in a specific position for up to 1 hour
- I can keep my head in a specific position for no more than 30 minutes

<< >>

RAND American Life Panel

SOURCE: Health and Functional Capacity Survey (HFCS) adapted from UWV's FML.

example, the FML measures durational capacity and uses a diagram for clarity. The HFCS also included questions on educational attainment and the presence of health conditions to capture information recorded by the UWV specialists in the Dutch model. To align our analysis sample with the age range for DI-covered workers, we exclude responses from panelists older than age 65.

Table 1 presents the characteristics of our final analysis sample of 1,751 respondents aged 18–65 who passed the screening questions and subsequently completed the FML (hereafter, the HFCS sample). All statistics are weighted to match the March 2018 Annual and Social Economic Supplement to the Current Population Survey population distributions by age, sex, race and ethnicity, education, household income, and number of household members. The mean age in the HFCS sample is 44.2 (standard deviation [SD] 12.3), and 50 percent are female. Approximately 71 percent of the sample identify as White, 14 percent identify as Black, and 4 percent identify as Asian or Pacific Islander; 27 percent report Hispanic or Latino ethnicity. Educational attainment was initially measured by the HFCS using 12 U.S. classifications, which we then aggregated into three broader groups (see Appendix Table A-2). Six percent of the HFCS sample had not graduated high school, 60 percent had a high school diploma or some college, and 34 percent had a bachelor's degree or higher. Most respondents (83 percent) reported a specific field of education, with the most common being health care (28 percent), technical (20 percent), and services (17 percent).

Three-quarters of the HFCS sample were working around the time of the survey and 5 percent reported receiving disability benefits (DI or SSI). On average, respondents reported 2.2 (SD 2.6) health conditions and 7.3 (SD 9.0) functional limitations (defined as "below normal" or "limited" levels for the functional abilities listed in the questionnaire).

Table 1.
Selected characteristics of the HFCS sample

Characteristic	Mean
Age (years)	44.2 (12.3)
By education level	
Less than high school	46.4
High school or some college	44.5
Bachelor's degree or higher	43.2
Women (%)	50
Race and ethnicity (%)	
White or Caucasian	71
Black or African American	14
Asian or Pacific Islander	4
Hispanic or Latino	27
Education level (%)	
Less than high school	6
High school or some college	60
Bachelor's degree or higher	34
Education field (%)	
Administration	8
Agriculture	1
Art and culture	1
Commercial	8
Health care	28
Services	17
Technical	20
Currently working (%)	75
Receiving U.S. disability benefits (%)	5
Number of health conditions (Maximum: 57)	2.2 (2.6)
Number of functional limitations (Maximum: 97)	7.3 (9.0)
By education level	
Less than high school	12.5
High school or some college	8.6
Bachelor's degree or higher	4.1

SOURCE: 2019 Health and Functional Capacity Survey (HFCS) fielded in the RAND American Life Panel (April and May).

NOTES: The HFCS was completed by 2,657 respondents (a 78 percent completion rate). Our final sample is limited to 1,751 respondents aged 18–65 who passed screening questions.

Observations are weighted to match the March 2018 Annual and Social Economic Supplement to the Current Population Survey population distributions by age, sex, race and ethnicity, educational level, household income, and number of household members.

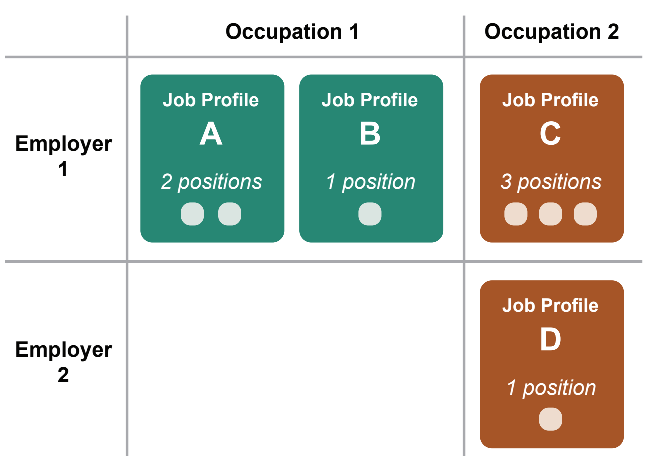
Standard errors are shown in parentheses where applicable.

Job Profile Data

We obtained comprehensive, proprietary data from the UWV on the training and functional requirements of 5,479 active job profiles at 1,553 employers as of May 1, 2018 (UWV 2018), through a restricted data use agreement. The UWV job profile database is maintained by *occupational analysts* employed by the UWV. The descriptive content and requirements for each job profile are collected by an analyst during a multi-hour, in-person workplace visit. During this visit, the occupational analyst interviews the worker(s) performing the job, their supervisor, and a human resources employee. In addition, the analyst observes the worker(s) performing their activities and asks questions for clarification. Because the job profile database is designed to aid in identifying jobs that individuals not currently working in them could perform (potentially after additional education), it only includes jobs that do not require prior work experience in other jobs within the same firm. The database also only includes profiles for jobs with high employment security, or "open-ended employment agreements." Temporary jobs and alternative work arrangements, held by 36 percent of all working individuals in the Netherlands (Flexbarometer n.d.), are excluded, as are certain occupations requiring specific beliefs, such as military, religious, or sex work occupations. Each job profile is updated with current information from the employer approximately every 18 months. If an update has not occurred for more than 24 months, the job profile is considered inactive and is no longer used in the disability determination procedure.

Chart 4 represents the structure of the job profile data, based on seven employees at two employers. Employer 1 employs six employees, each of whom hold a single position: three are in Occupation 1 and three are in Occupation 2. The three employees in Occupation 1 share the same generalized tasks, but the two employees in Job Profile A differ from the employee in Job Profile B in some key characteristic, such as weekly work hours or shift work. In this hypothetical example, four employees work in Occupation 2: three for Employer 1 and one for Employer 2.

Chart 4.
Illustrative job profile data structure



SOURCE: Authors' schematic of Dutch job profile data.

Even if these four employees in Occupation 2 share the exact same tasks and work characteristics, their positions are described by two different job profiles (C and D), corresponding to their respective employers.

The job profile data contain information on 114 generalized tasks and 284 occupations defined by the six-digit Dutch Standard Occupational Classification (Standaard BeroepenClassificatie). Chart 5 depicts the job profile data for a hypothetical job profile of a "breakfast staff" member, classified in the "waiter" occupational category. This profile has two generalized tasks: handling customer payments and serving drinks and meals. Across all job profiles in the database, the three most common generalized tasks (those with the most associated job profiles) are cleaning or tidying (488 job profiles, 11 occupations), handling customer payments (311 job profiles, 9 occupations), and carrying out sales activities (279 job profiles, 12 occupations).

The 5,479 individual job profiles in the UWV dataset reflect diverse occupations and work requirements (Table 2). Within each occupation-employer combination, the mean number of job profiles is 2.7 (SD 2.9). The majority of job profiles have only one or two positions, yet the 95th percentile has 20 positions. The mean number of positions per job profile is 5.5 (SD 16.1), and the mean number of positions per occupation is 106.9 (SD 179.0).

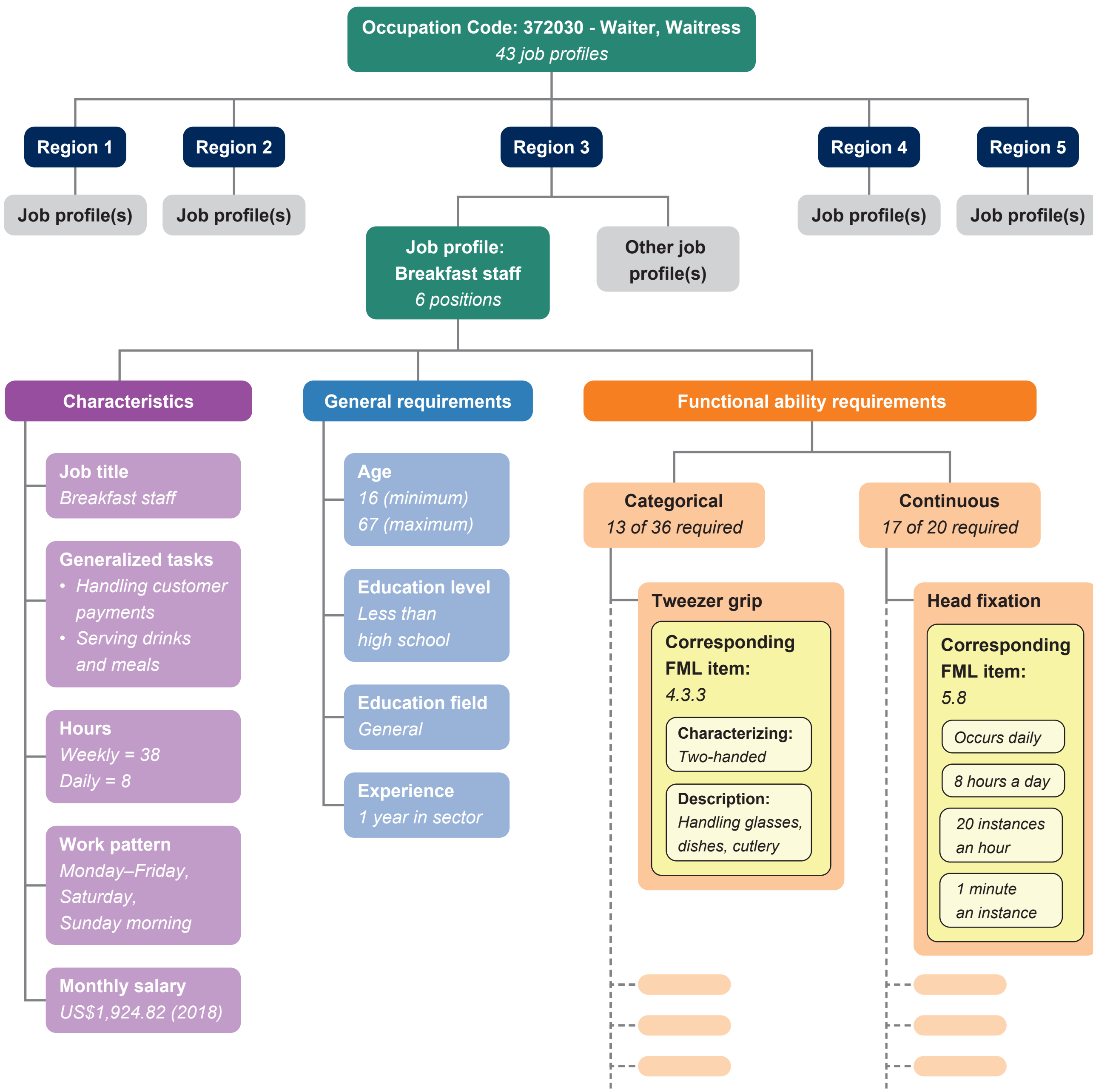
The mean daily work hours are 7.5 (SD 1.4), with more than half of the job profiles requiring workdays of 8 hours or more. While the mean weekly work hours are 27.3 (SD 9.8), the 5th to 95th percentiles range from 9 to 40, reflecting substantial variation among job profiles. Differing weekly work hours contribute to much of the variation in earnings across job profiles. In 2018 U.S. dollars, the mean hourly wage for all job profiles is $14.57 (SD $3.29) and the mean monthly earnings, calculated as the product of hourly wage and monthly work hours, are $1,761 (SD $810).

The UWV job profiles map to seven Dutch education levels, which we aggregate into three broad U.S. levels (Appendix Table A-2): less than high school (required by 55 percent of job profiles), high school or some college (30 percent), and bachelor's degree or higher (15 percent). In our data, no occupation includes job profiles with more than two different (though always adjacent) education levels. Job profiles may require a single specific field of training, out of seven available options: administration (required by 5 percent of job profiles), agriculture (1 percent), art and culture (less than 1 percent), commercial

(1 percent), health care (14 percent), services (4 percent), and technical (12 percent). Most job profiles (62 percent) do not require a specific field of education and are therefore classified in the data with a "general" field. Additional educational requirements are recorded in an open-ended text entry, typically describing the field of education in greater detail. Job profiles requiring specific fields are uncommon at lower educational requirement levels.

Required work experience is described in open-ended text. We use text matching on variants of "not required" or the absence of open-ended text to create a binary indicator for required prior work experience. Approximately 75 percent of the job profiles do not require prior work experience. There is little variation in the minimum and maximum ages required by job profiles. The mean minimum age is 16.8 (SD 1.1); the mean maximum age is 67 (SD 0.3), reflecting

Chart 5.
Hypothetical job profile data: Breakfast staff



SOURCE: Authors' schematic of Dutch job profile data.

NOTE: This job profile is a composite of the 43 waiter job profiles in the Dutch job profile database.

the statutory retirement age of 67 in the Netherlands in 2018.

Finally, each job profile contains all the functional requirements that must be accounted for by the job matching procedure. The mean number of functional requirements captured by the job profiles is 27.9 (SD 5.4), out of a total of 53 possible requirements. While some functional requirements are relatively simple and can be characterized by a single scale, other requirements require a more complex scale with multiple dimensions. After recoding the check-all-that apply variables, there are a total of 35 possible functional job requirements that consist of only a single dimension. Typically, these are binary variables indicating whether a certain functional ability is required for a specific job profile, or ordinal categorical variables. Hours worked per week and per day are measured on a continuous scale. The mean number of unidimensional functional requirements per job profile is 14.5 (SD 4.0). The 18 remaining functional job requirements are multidimensional combinations of characteristics, such as distance, duration, angle,

Table 2.
Selected characteristics of Dutch job profiles

Characteristic	Mean	Standard deviation	Percentile		
			5th	50th	95th
Job profile structure					
Job profiles per occupation-employer	2.7	2.9	1	2	8
Positions per job profile	5.5	16.1	1	2	20
Positions per occupation	106.9	179.0	6	53	342
Work hours					
Regular hours worked per day	7.5	1.4	4	8	9
Hours worked per week	27.3	9.8	9	28	40
Earnings (2018 US$)					
Hourly	14.57	3.29	11.27	13.55	20.89
Monthly	1,761.11	809.63	514.48	1,767.17	3,068.42
Education level (%)					
Less than high school	55	. . .	. . .	. . .	. . .
High school or some college	30	. . .	. . .	. . .	. . .
Bachelor's degree or higher	15	. . .	. . .	. . .	. . .
Education field (%)					
Administration	5	. . .	. . .	. . .	. . .
Agriculture	1	. . .	. . .	. . .	. . .
Art and culture	a	. . .	. . .	. . .	. . .
Commercial	1	. . .	. . .	. . .	. . .
Health care	14	. . .	. . .	. . .	. . .
Services	4	. . .	. . .	. . .	. . .
Technical	12	. . .	. . .	. . .	. . .
General	62	. . .	. . .	. . .	. . .
General qualifications					
No prior experience needed (%)	75	. . .	. . .	. . .	. . .
Minimum age	16.8	1.1	16	16	18
Maximum age	67.0	0.3	67	67	67
Functional job requirements [b]					
Total (Maximum: 53)	27.9	5.4	19	28	37
Unidimensional (Maximum: 35)	14.5	4.0	8	14	22
Multidimensional (Maximum: 18)	13.4	2.1	10	14	16

SOURCE: 2018 Dutch job profile data from UWV.

NOTES: Based on all 5,479 Dutch job profiles active on May 1, 2018.

. . . = not applicable.

a. Less than 1 percent.

b. See Appendix Table A-1 for a listing of all functional job requirements by dimensionality.

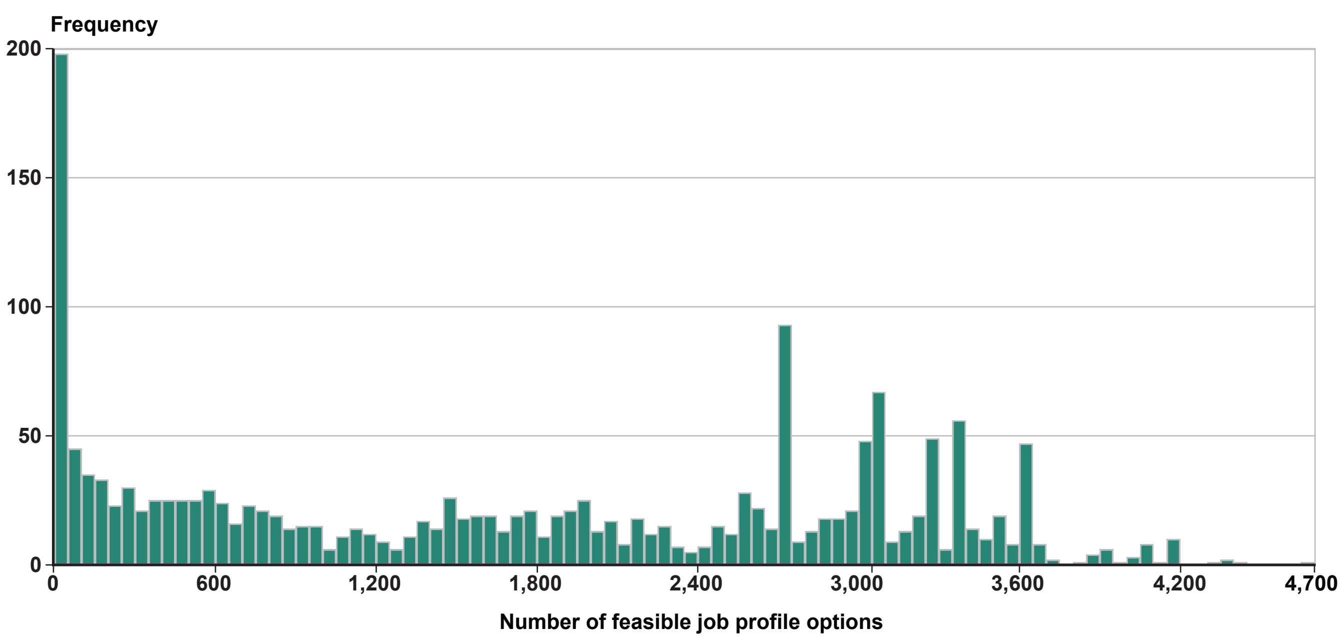
and frequency, with potentially multiple combinations per requirement and job profile. The mean number of multidimensional requirements with at least one recorded combination per job profile is 13.4 (SD 2.1). Appendix Table A-1 lists all functional job requirements by dimensionality.

Measuring Work Capacity in a Sample of U.S. Working-Age Adults

In this section, we estimate work capacity in the HFCS sample by applying the UWV automated preselection algorithm described above to the FML data on functional abilities obtained from HFCS respondents. Recall that the UWV algorithm deems feasible only those job profiles for which a respondent's functional abilities, educational attainment, and field of education meet all job requirements. Our replication of the automated preselection procedure accounts for 58 functional abilities corresponding to 50 functional job requirements (Appendix Table A-1). Because our research process does not include disability assessors, we include all job profiles with flagged functional requirements. In an actual disability determination procedure, disability assessors exclude some of the flagged items, eliminating some job profiles in the feasible set, which may decrease estimated work and earnings capacity. (We examine the importance of this assumption later in this section.) Additionally, because we do not know the number of years of past work experience for individuals in the HFCS sample, we use an estimate of this measure calculated as age minus five minus years of completed schooling through college. Finally, to allow algorithmic matching between the 7 education levels in the Dutch job profile data and the 12 education levels captured in the HFCS, we aggregate both sets to align with 3 broad U.S. education levels (Appendix Table A-2).

Chart 6 illustrates the distribution of the estimated number of feasible job profiles in the HFCS sample, and Table 3 displays corresponding summary statistics. Sixty-two respondents (5.4 percent of the weighted sample) were estimated to have zero feasible job profile options. Beyond that, variation in the estimated number of feasible job profiles is driven by two important factors. First, recall that two employees working in the same occupation for the same employer may have different job profiles if their jobs differ in some key characteristic, such as weekly work hours or shift work; as a result, weekly work hours drive much of the variation in the number of feasible job profiles. Second,

Chart 6.
Distribution of the estimated number of feasible job profiles in the HFCS sample



SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTES: Sample limited to 1,751 respondents aged 18–65 who passed screening questions.

Specified bin width is 50.

Table 3.
Estimates of work capacity in the HFCS sample, by education level

Estimate and education level	Mean	Standard deviation	Percentile		
			5th	50th	95th
Number of feasible—					
Job profiles per respondent					
All	1,701	1,282	0	1,781	3,557
Less than high school	737	896	0	285	2,485
High school or some college	1,405	1,186	0	1,321	3,011
Bachelor's degree or higher	2,399	1,187	243	2,859	4,049
Occupations per respondent					
All	126	80	0	144	226
Less than high school	53	49	0	44	129
High school or some college	106	75	0	121	193
Bachelor's degree or higher	175	66	33	209	251
Monthly earnings capacity (2018 US$)					
All	3,514	1,643	0	3,724	5,817
Less than high school	2,031	1,188	0	2,345	3,128
High school or some college	2,818	1,264	0	3,484	3,756
Bachelor's degree or higher	5,012	1,170	2,897	5,817	5,817
Percentage with earnings capacity—					
Below the SGA threshold [a]					
All	11.8	. . .	. . .	. . .	. . .
Less than high school	28.5	. . .	. . .	. . .	. . .
High school or some college	15.5	. . .	. . .	. . .	. . .
Bachelor's degree or higher	2.1	. . .	. . .	. . .	. . .
Equal to zero					
All	8.5	. . .	. . .	. . .	. . .
Less than high school	18.7	. . .	. . .	. . .	. . .
High school or some college	11.5	. . .	. . .	. . .	. . .
Bachelor's degree or higher	1.4	. . .	. . .	. . .	. . .

SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTES: Sample limited to 1,751 respondents aged 18–65 who passed screening questions.

Observations are weighted to match the March 2018 Annual and Social Economic Supplement to the Current Population Survey population distributions by age, sex, race and ethnicity, educational level, household income, and number of household members.

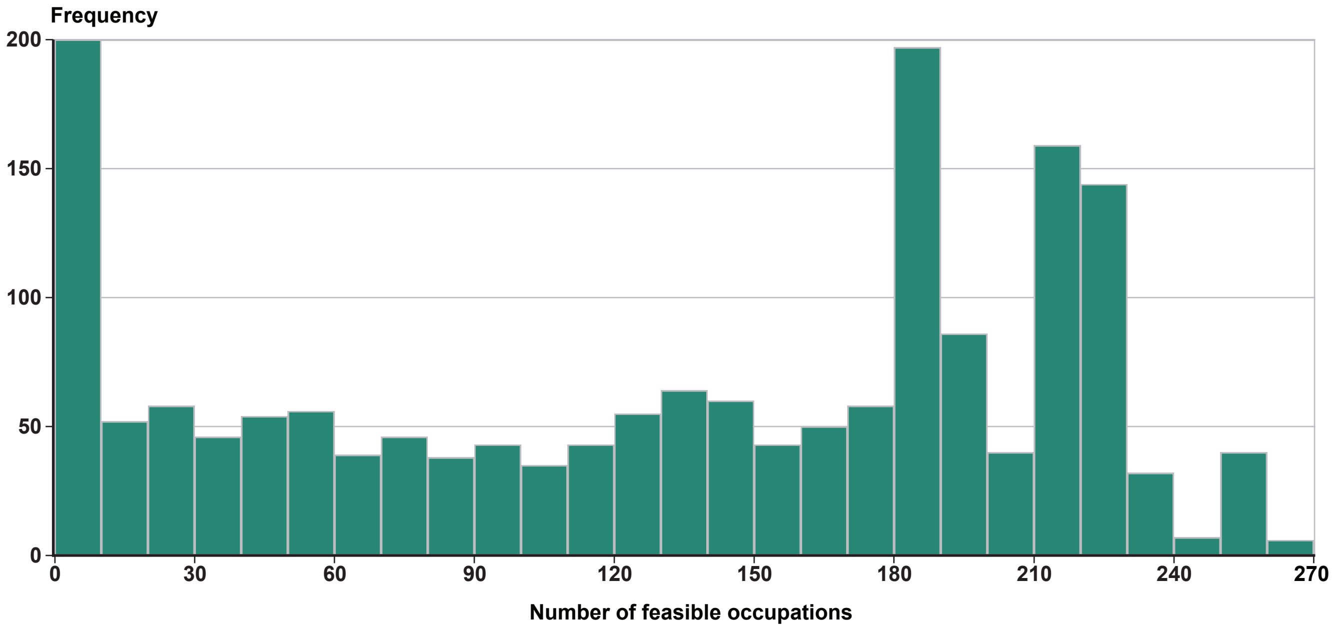
SGA = substantial gainful activity; . . . = not applicable.

a. US$1,180 in 2018 for nonblind individuals.

education level and field determine the theoretical maximum number of feasible job profiles, even in the absence of functional limitations. Chart 7 shows the distribution of the number of occupations with at least three positions across the feasible job profiles. Seventy-one respondents (5.9 percent, weighted) were estimated to have zero feasible occupation options. As shown in Table 3, the mean number of feasible job profiles per respondent is 1,701 (SD 1,282), and the mean number of feasible occupations per respondent is 126 (SD 80).

To determine earnings capacity, we develop a simulation procedure that approximates the UWV procedure. The simulation begins by identifying and eliminating strictly dominated job profiles (that is, job profiles that would never appear in any individual's feasible job set because of their low earnings or hours), starting from the feasible job profiles with the highest hourly wages and dropping job profiles that should never be selected by a disability assessor because they cannot increase earnings capacity according to the UWV formula. Next, we make 2,500 random draws of job profile sets (where the size of the set also varies randomly) from the reduced set of feasible job profiles. Within each drawn set, we collapse the job profiles by occupation, assigning each occupation the maximum weekly work hours and the median hourly wage

Chart 7.
Distribution of the number of occupations with at least three positions across the estimated feasible job profiles in the HFCS sample



SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTES: Sample limited to 1,751 respondents aged 18–65 who passed screening questions.

Specified bin width is 10.

of its associated job profiles. Occupations are then ranked by the median hourly wage, and all but the top three are discarded. The estimated earnings for each drawn set are the product of the median hourly wage of the second-highest-earning occupation and the minimum weekly work hours across the three occupations. Finally, each respondent's estimated earnings capacity is the maximum value of earnings across the 2,500 draws.

This simulation approach approximates the job profile selection process that maximizes estimated earnings capacity according to UWV rules. It is possible that the job profile set maximizing estimated earnings capacity for a respondent was not drawn in the simulation procedure. Therefore, our simulation provides a lower bound for the estimated earnings capacity for any given set of feasible job profiles. With this probabilistic method, our earnings estimates are more accurate for respondents with smaller feasible job profile sets, because a larger share of the available combinations will have been drawn in the simulation.

As shown in Table 3, the mean estimated monthly earnings capacity (in 2018 U.S. dollars) in the HFCS sample is $3,514 (SD $1,643). In addition to calculating earnings capacity for each respondent, we also compare their estimated earnings capacity to the 2018 SGA threshold. We find that 11.8 percent of the HFCS sample has an estimated earnings capacity below the SGA threshold. Among those unable to perform SGA, the vast majority (72.5 percent, or 8.5 percent of the full sample) have zero estimated earnings capacity. (Note that the estimate of zero earnings capacity is less sensitive to the assumption that earnings levels in the Netherlands are comparable to U.S. earnings levels[8] because it is driven entirely by the presence or absence of matched job profiles.) For comparison, 11.6 percent of U.S. adults aged 16–64 in the 2019 Current Population Survey report missing work in 2018 because of either a disability or having difficulty with one or more of the following: hearing, vision, memory, mobility, a physical difficulty, or a personal care limitation (Flood and others 2025). Earnings capacity is positively associated with education: among individuals with less than a high school education, 28.5 percent have estimated earnings capacity below SGA, and 18.7 percent have estimated earnings capacity of zero, compared with 2.1 percent and 1.4 percent, respectively, of respondents with at least a bachelor's degree.

We tested the sensitivity of our baseline estimates (Table 3) to possible specification changes (Table 4). As discussed in the Background, the UWV algorithm flags some matched job profiles with functional ability requirements that require follow up by a disability assessor, a step we are unable to replicate. Our baseline specification accepts all such flagged profiles, representing an upper bound of the size of the feasible job set. In the actual UWV procedure, disability assessors would likely resolve some of the flagged items, so excluding all flagged items represents a lower bound of feasible job set size. Indeed, we find that excluding all flagged job profiles eliminates 470 feasible job profiles (28 percent) and 31 occupations (25 percent), on average. When profiles with flagged requirements are excluded, we estimate that 25.3 percent of HFCS

Table 4.
Sensitivity analysis of estimates of work capacity in the HFCS sample, by education level

Estimate and education level	Baseline (accept flagged profiles) [a]	Alternative assumptions				
		Exclude flagged profiles [b]	Relax three-occupation minimum [c]	Relax education field restriction	Restrict to current education level	Use maximum earnings [d]
Number of feasible—						
Job profiles per respondent						
All	1,701	1,231	1,701	2,469	314	1,701
Less than high school	737	427	737	869	737	737
High school or some college	1,405	960	1,405	2,076	261	1,405
Bachelor's degree or higher	2,399	1,857	2,399	3,455	330	2,399
Occupations per respondent						
All	126	95	126	160	34	126
Less than high school	53	28	53	59	53	53
High school or some college	106	76	106	137	33	106
Bachelor's degree or higher	175	141	175	219	32	175
Monthly earnings capacity (2018 US$)						
All	3,514	2,899	3,584	3,787	3,322	4,887
Less than high school	2,031	1,234	2,139	2,177	2,030	2,228
High school or some college	2,818	2,256	2,896	3,188	2,585	3,151
Bachelor's degree or higher	5,012	4,337	5,025	5,141	4,857	8,434
Percentage with earnings capacity—						
Below the SGA threshold [e]						
All	11.8	25.3	9.7	11.4	18.7	10.8
Less than high school	28.5	53.9	23.4	28.5	28.5	28.5
High school or some college	15.5	32.2	12.7	15.0	24.4	14.1
Bachelor's degree or higher	2.1	7.8	1.6	1.7	6.7	1.5
Equal to zero						
All	8.5	23.1	6.3	8.2	17.7	8.5
Less than high school	18.7	50.3	13.6	18.7	18.7	18.7
High school or some college	11.5	29.9	8.5	11.0	23.8	11.5
Bachelor's degree or higher	1.4	6.2	0.9	1.2	6.7	1.4

SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTES: Sample limited to 1,751 respondents aged 18–65 who passed screening questions.

Observations are weighted to match the March 2018 Annual and Social Economic Supplement to the Current Population Survey population distributions by age, sex, race and ethnicity, educational level, household income, and number of household members.

SGA = substantial gainful activity.

a. Reproduces baseline specification (Table 3) in which we accepted all job profiles with flagged functional ability requirements.

b. Excludes all job profiles with flagged functional ability requirements.

c. Relaxes restriction that at least three occupations must be matched.

d. Calculates estimated earnings capacity using maximum (rather than median) earnings of the top three job profiles.

e. US$1,180 in 2018 for nonblind individuals.

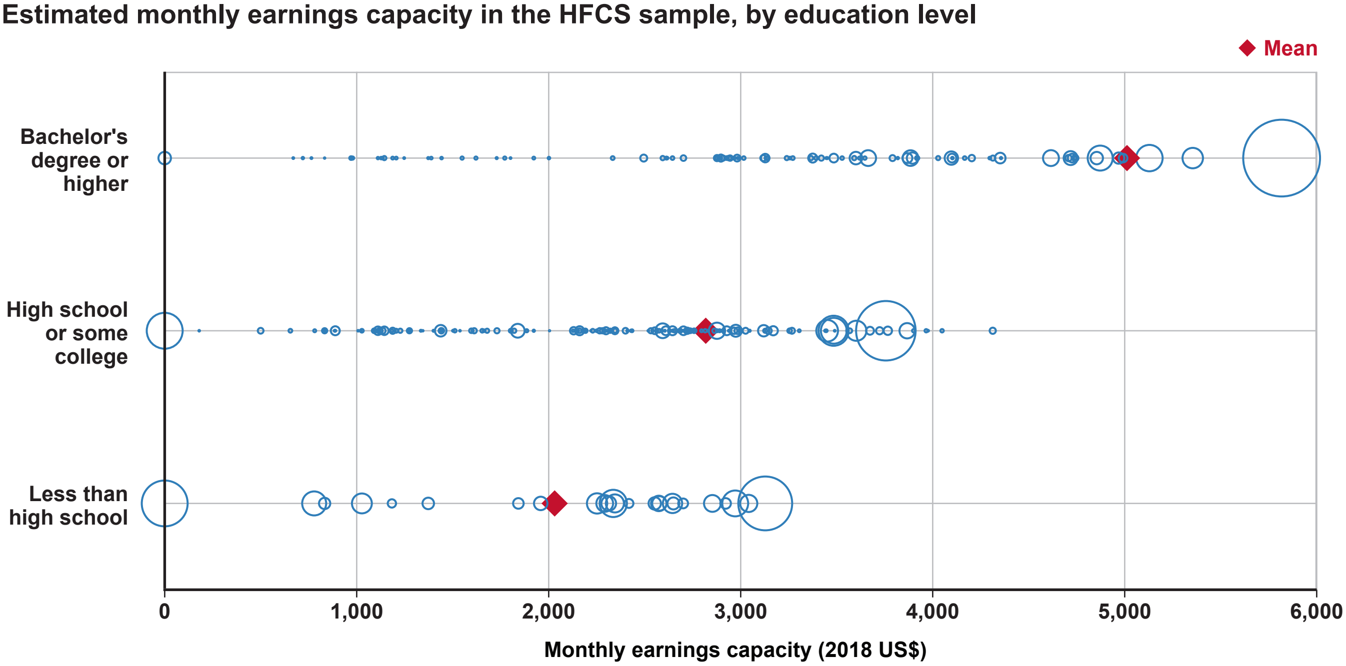
respondents would earn less than the SGA threshold and 23.1 percent would have an estimated earnings capacity of zero dollars.

Alternatively, we could relax the restriction that at least three occupations must be feasible (while maintaining the restriction that at least nine feasible positions must exist) or relax specific field of education requirements. Relaxing either of these restrictions reduces the percentage of respondents with low earnings capacity, while only slightly increasing estimated monthly earnings capacity. We also tested imposing an additional restriction that feasible positions must require the same education level as the respondent has (as opposed to the same education level or lower); the number of feasible job profiles and number of feasible occupations dramatically decrease under this alternative, but the estimated earnings capacity, overall and by education level, is not substantially affected by this additional restriction. Finally, we estimated potential earnings using the maximum, rather than the median, of the three top-earning job profiles, which increases mean monthly earnings capacity by 39 percent overall and by more than two-thirds (68 percent) for respondents with at least a bachelor's degree.

Our findings underscore the key role of education as a determinant of earnings capacity. Chart 8 displays the mean and range of estimated earnings for the HFCS respondents by education level, where the size of the bubbles represents the share of respondents within each education group with a given level of potential earnings. The highest-earning occupations require a bachelor's degree, while the lowest-earning occupations do not require a high school diploma, leading to large differences in the theoretical maximums of potential monthly earnings by education level ($5,012 for college graduates, $2,818 for high school graduates, and $2,031 for individuals without a high school diploma). In addition, differences in potential earnings by education level reflect the fact that college graduates tend to report fewer functional limitations than high school graduates report (4.1 versus 8.6, on average), and high school graduates tend to report fewer functional limitations than individuals without a high school diploma report (12.5, on average) (Table 1).

Because our survey data include both functional abilities and educational credentials, we can use a decomposition exercise to explore the relative contributions of these measures to economic returns to education (Table 5). First, we divide the HFCS sample into mutually exclusive subgroups based on actual education level, then we estimate mean monthly earnings capacity for each subgroup if their education level was less than high school, high school or some college, or at least a bachelor's degree, respectively. The results

Chart 8.
Estimated monthly earnings capacity in the HFCS sample, by education level



SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTE: Sample limited to 1,751 respondents aged 18–65 who passed screening questions.

Table 5.
Mean estimated monthly earnings capacity for each education level subgroup in the HFCS sample, by simulated education level (in 2018 U.S. dollars)

Education level subgroup	Simulated education level: Less than high school	Simulated education level: High school or some college	Simulated education level: Bachelor's degree or higher
Less than high school	2,031 (1,188)	2,393 (1,411)	3,280 (2,088)
High school or some college	2,379 (1,059)	2,818 (1,264)	4,020 (1,995)
Bachelor's degree or higher	2,898 (519)	3,428 (622)	5,012 (1,170)

SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTE: Each row divides the sample into mutually exclusive groups based on actual education level, and each column presents mean estimated monthly earnings capacity (with standard deviations in parentheses) assuming an education level of less than high school, high school or some college, or at least a bachelor's degree, respectively. The diagonal cells (where actual education is the same as simulated education) correspond to the mean monthly earnings capacity estimates by education presented in Table 3.

when actual education is the same as simulated education equal the estimates of mean monthly earnings by education level presented in Table 3. We find that, for high school graduates versus college graduates, the difference in average functional abilities between groups affects earnings capacity less than increased job access resulting from a college degree; but for individuals with and without a high school diploma, the difference in average functional abilities has about the same effect on earnings capacity as access to occupations requiring a high school diploma. Note that the estimated effect of education on functional abilities likely reflects a mix of selection bias (that is, individuals with fewer functional limitations self-select into higher education levels) and a true causal effect of education on functional abilities (which may also include the indirect effects of current and past job demands on one's functioning).

Specifically, we can see in Table 5 that, starting from the position of a high school graduate, if we were to hypothetically give these respondents a college degree (thereby granting them access to additional, higher-earning job profiles), they would increase their potential monthly earnings by $1,202 ($4,020 − $2,818). If, instead of the degree, we were to give them only the *functional ability profile* of an average college graduate, they would increase their potential earnings by only $610 ($3,428 − $2,818). Therefore, the average college graduate would be better off keeping their degree itself and forgoing the functional ability gains associated with the degree.

The story changes for individuals on the margin of a high school education. Starting again from the position of a high school graduate, if we were to hypothetically *take away* their high school diploma, they would reduce their potential monthly earnings by $439 ($2,818 − $2,379), on average. If instead we were to replace the average high school graduate's functional abilities with the average functional abilities profile of a person without a high school diploma, then they would reduce their average potential earnings by $425 ($2,818 − $2,393). Therefore, in contrast to the average college graduate, the average high school graduate is not substantially better off in one scenario versus the other.

Our study concludes with an exploration of the characteristics of five groups from the HFCS sample: (1) overall, (2) workers, (3) DI or SSI beneficiaries, (4) individuals identified by the UWV algorithm as having earnings capacity below SGA, and (5) individuals identified by the algorithm as having zero earnings capacity (Table 6). For each group, we report the mean monthly earnings (actual[9] and estimated); mean numbers of health conditions and functional limitations; distributions of usual weekly work hours (0, 1–19, 20–39, and 40 or more), education levels, and age groups; the percentages reporting at least one health condition or DI or SSI receipt; and the percentages with estimated potential earnings capacity below SGA, estimated earnings capacity of zero, or zero feasible job profiles.

Among the workers in the sample, about two-thirds report at least one health condition, averaging 2.0 health conditions and 5.5 functional limitations. Only 3.9 percent of workers have estimated earnings capacity below SGA, and only 0.6 percent have no feasible job profiles. Mean actual monthly earnings ($5,219) exceed mean estimated monthly earnings ($3,902), which is unsurprising because the latter is calculated from only the median of the three highest-earning job profiles matched in the jobs database.

Most self-reported DI and SSI beneficiaries in the HFCS sample (80.2 percent) are not working at all, whereas 6.1 percent report working full time despite being subject to the SGA earnings limit. Nearly all DI and SSI beneficiaries (93.7 percent) report at least one health condition, averaging 5.4 health conditions and 23.4 functional limitations. The UWV algorithm estimates that 61.2 percent of the DI and SSI beneficiaries have earnings capacity below SGA; in other words, approximately two-thirds of the DI and SSI beneficiaries meet the conceptual standard for DI benefits and SSI in the United States according to the Dutch disability determination procedure. On average, DI and SSI

Table 6.
Selected characteristics of the HFCS sample, by subgroup

Characteristic	Overall sample	Workers	DI and SSI beneficiaries	Respondents with estimated earnings capacity— Below the SGA threshold [a]	Respondents with estimated earnings capacity— Equal to zero
Mean monthly earnings					
Actual	3,920	5,219	484	773	699
Estimated	3,514	3,902	1,143	265	0
Mean number of—					
Health conditions	2.2	2.0	5.4	3.9	4.3
Functional limitations	7.3	5.5	23.4	23.4	25.7
Percentage distributions					
Hours worked per week					
0 (not working)	25.4	0.0	80.2	75.5	78.7
1–19	3.3	4.5	9.0	2.5	2.7
20–39	13.3	17.9	4.7	6.2	3.9
40 or more	57.5	77.1	6.1	12.9	10.7
Education level					
Less than high school	6.2	5.0	12.0	15.1	13.6
High school or some college	59.8	55.8	79.4	78.6	80.3
Bachelor's degree or higher	34.0	39.2	8.6	6.0	5.5
Age group					
Younger than 35	29.0	30.3	6.3	22.5	27.8
35–44	23.9	25.4	13.5	19.2	12.2
45–54	21.4	23.1	25.5	21.3	26.4
55–65	25.7	21.1	54.7	37.0	33.6
Percentage—					
Reporting at least 1 health condition	66.5	65.2	93.7	70.0	68.3
Receiving U.S. disability benefits	5.4	1.4	100.0	28.1	32.6
With estimated earnings capacity below the SGA threshold [a]	11.8	3.9	61.2	100.0	100.0
With zero estimated earnings capacity	8.5	2.4	51.5	72.5	100.0
With zero feasible job profiles	5.4	0.6	31.3	45.7	63.0
Number of observations	1,751	1,310	118	180	128

SOURCES: 2019 Health and Functional Capacity Survey (HFCS); 2018 Dutch job profile data from UWV.

NOTES: Sample limited to 1,751 respondents aged 18–65 who passed screening questions.

Observations are weighted to match the March 2018 Annual and Social Economic Supplement to the Current Population Survey population distributions by age, sex, race and ethnicity, educational level, household income, and number of household members.

Rounded components of percentage distributions do not necessarily sum to 100.0.

SGA = substantial gainful activity.

a. US$1,180 in 2018 for nonblind individuals.

beneficiaries earn $484 per month, which is below their estimated monthly earnings capacity of $1,143; this is expected because earnings above the SGA threshold can trigger benefit suspension or termination. Relative to the overall HFCS sample, DI and SSI beneficiaries tend to be older (up to the sample's maximum age of 65) and have lower educational attainment.

Compared with DI and SSI beneficiaries, individuals with estimated earnings capacity below SGA tend to work more hours per week, although both groups are much more likely than the overall population to be not working (80.2 percent for DI and SSI beneficiaries, 75.5 percent for individuals with earnings capacity below SGA, and 25.4 percent in the overall population). Note that there is overlap between the subgroups: 28.1 percent of individuals with earnings capacity below SGA report receiving DI benefits or SSI (although we do not know how many nonbeneficiaries may be in the application process). Respondents with earnings capacity below SGA are much less likely to report a health condition than DI and SSI beneficiaries (70.0 percent versus 93.7 percent), but they report the same number of functional limitations on average (23.4). Despite the fact that many individuals in this group do not receive DI benefits or SSI, average actual monthly earnings ($773) are substantially less than the 2018 SGA limit for nonblind individuals ($1,180), while also higher than average estimated monthly earnings ($265). Although the distributions by education are similar for DI and SSI beneficiaries and individuals with estimated earnings capacity below SGA, the age distributions are very different. In particular, individuals with earnings capacity below SGA are much more likely to be younger than 35 and much less likely to be aged 55–65 than DI and SSI beneficiaries.

The last subgroup we considered are HFCS respondents who were identified by the UWV algorithm as having *zero* earnings capacity. As noted earlier, this final group is less sensitive to the assumption that earnings levels in the Netherlands are comparable to earnings levels in the United States. Individuals with zero estimated earnings capacity report having 4.3 health conditions and 25.7 functional limitations, on average, and 63 percent have zero feasible job profiles in the Dutch job profile database. Note that respondents can have zero estimated earnings capacity even if some feasible job profiles are identified if those profiles do not meet the minimum number of occupations or positions per job profile. Despite having zero earnings capacity, only a third of these individuals (32.6 percent) report receiving DI benefits or SSI.

Discussion and Conclusion

In this article, we apply aspects of the Dutch disability determination process to a sample of U.S. adults to estimate work capacity. Using the Dutch method, we find that 11.8 percent of U.S. working-age adults have an estimated earnings capacity lower than the SGA threshold used to determine DI benefit eligibility in the U.S. system. We also find that earnings capacity is positively associated with education, reflecting both differences in the functional abilities of individuals in different education groups as well as differences in access to higher-paying jobs based on educational credentials. For high school graduates versus college graduates, the difference in average functional abilities matters less than having a college degree, but for individuals with and without a high school diploma, the difference in average functional abilities matters about the same as having a diploma.

The methods we use to measure work capacity reflect a simplification of the Dutch procedure: Instead of highly trained specialists measuring functional abilities, we use the results of a self-administered survey. Additionally, UWV disability assessors individually accept or reject feasible job profiles with flagged functional requirements, a part of the process we are unable to replicate. The treatment of flagged profiles is shown to generate large differences in the estimates of disability prevalence; rejecting (rather than accepting) all job profiles with flagged requirements more than doubles the share of the HFCS sample with estimated earnings capacity below SGA (25 percent versus 12 percent). Despite our study's limitations, qualitatively similar differences across education groups remain. Overall, we find that our estimates do not vary much under different assumptions about how respondents are matched to feasible job profiles and how job profiles are combined to generate estimates of work capacity.

While there is some overlap in our sample between current DI and SSI beneficiaries and individuals identified by the Dutch method as having earnings capacity below SGA, a comparison of the two groups highlights important differences. Only 61 percent of DI and SSI beneficiaries are estimated to have earnings capacity below SGA. Conversely, fewer than a third of individuals estimated to having earnings capacity below SGA report receiving DI benefits or SSI. Those estimated to have earnings capacity below SGA are less likely to report health conditions than DI and SSI beneficiaries, but they report the same number of functional limitations on average. While the two groups tend to work at similar rates and have similar educational profiles, individuals with estimated earnings capacity below SGA tend to be much younger than DI and SSI beneficiaries. Having low earnings capacity is a critical vulnerability for these relatively young workers—should their health and functional abilities deteriorate further, their prospects for transferring their skills to other jobs in the economy are low.

Our results suggest that if the United States were to retroactively adopt the Dutch method for disability determination there may be some individuals who currently qualify for benefits who would no longer be eligible and vice versa. However, prior research suggests that certain groups' outcomes would likely remain the same under the Dutch method. For instance, Strand and Trenkamp (2015) examine claimants denied at the U.S. disability determination step 5 (those who were found unable to continue in their prior jobs but still deemed capable of other work) and find that median post-disability-onset earnings for these claimants generally fall by 25–35 percent, just under the Dutch earnings loss threshold. This suggests that many of these denials would also be denials under the Dutch system. Moreover, the shares of applicants allowed and denied in the U.S. and Dutch systems are currently quite similar, suggesting that the overall allowance and denial rates for DI and SSI would not change appreciably were the Dutch method to be adopted in the United States. Future research is needed to understand whether the Dutch method identifies individuals with earnings potential below SGA more accurately than the current U.S. method, though this is complicated by the fact that the current U.S. method relies on outdated information about occupational requirements and that actual work capacity is never observed, only estimated.

Implementation of a new disability determination procedure, such as the one discussed in this article, is also potentially complicated by other features of the current U.S. system, such as long wait times while applicants pursue benefits through up to four appeal levels, during which time their functional abilities may potentially deteriorate (or improve). As already seen with the current U.S. system, applicants under a new system may also learn to game functional assessment procedures by exaggerating their functional limitations (although they are unlikely to be able to do so in a sophisticated way, because that would require deep knowledge of functional occupational requirements in the national economy). On the other hand, implementing a disability determination procedure based on congruences between functional abilities and occupational requirements could potentially reduce decision variability across individual disability examiners and administrative law judges who may apply policies inconsistently (Maestas, Mullen, and Strand 2013; Garcia-Gomez and others 2023). Furthermore, implementing a new disability determination process would also affect SSA's current procedures for monitoring policy compliance among adjudicators.

SSA is already taking steps to collect modern occupational requirements. However, the U.S. system still lacks a harmonized functional assessment, similar to the FML, that can be used to match DI or SSI applicants to feasible jobs by matching functional abilities with occupational requirements across multiple dimensions.

Appendix A

Table A-1.
Job requirements mapped to functional abilities measured by the Functional Abilities Questionnaire (FML), by study use and job requirement type

Job requirement	Functional ability
	Used for matching in our study
	General
Education level	. . .
Education field	. . .
Work pattern (days of week, time of day)	. . .
Prior work experience	. . .
	Multidimensional
Sitting	Time spent sitting uninterrupted Time spent sitting throughout work day
Standing	Time spent standing uninterrupted Time spent standing throughout work day
Walking	Time spent walking uninterrupted Time spent walking throughout work day
Climbing stairs	Ability to ascend or descend stairs
Climbing	Ability to ascend or descend steps
Kneeling or squatting	Ability to reach the ground by kneeling or squatting Ability to be active while kneeling or squatting
Active while bending	Ability to be active while bending or twisting
Short-cycle twisting	Ability to twist torso
Short-cycle bending	Ability to bend Frequency of bending throughout work day
Head movements	Ability to move head
Head fixation	Ability to keep head in specific position throughout work day
Reaching	Ability to stretch arm Frequency of stretching arm throughout work day
Being active above shoulder	Ability to be active with arm above shoulder
Lifting	Frequency of lifting and using lightweight objects Ability to frequently lift heavy loads
Lifting or carrying	Weight that one can lift or carry
Using mouse or keyboard [a]	Time spent using mouse or keyboard throughout work day
	Unidimensional
Sphere grip	Ability to grasp round object
Pen grip	Ability to handle objects between the tips of two fingers and thumb
Tweezer grip	Ability to handle objects between top of index finger and thumb
Key grip	Ability to grip objects with fingers and thumb
Cylinder grip	Ability to handle rod-shaped objects
Squeezing and gripping	Ability to grip with hand

(Continued)

Table A-1.
Job requirements mapped to functional abilities measured by the Functional Abilities Questionnaire (FML), by study use and job requirement type—*Continued*

Job requirement	Functional ability
Used for matching in our study (cont.)	
Unidimensional (cont.)	
Fine motor skills	Ability to make fine, accurate movements with fingers and hands
Repetitive acts	Ability to make repetitive movements with fingers and hands
Pushing and pulling	Weight that one can push or pull
Air draft	Exposure to draft or sudden air movements
Air quality: dust, smoke, gas, vapors	Exposure to dust, smoke, gas, or vapors
Cold	Exposure to cold
Heat	Exposure to heat
Skin contact	Exposure to substances that might make skin wet, dirty, or irritated
Vibrations	Exposure to vibrations or jolts
Seeing	Ability to see with or without the use of glasses or contact lenses
Hearing	Ability to hear with or without the use of hearing aids
Speaking	Ability to speak
Reading	Ability to read
Writing	Ability to write
Noise	Exposure to noise levels high enough to require protective equipment
Protective equipment	Ability to wear protective equipment
Personal risk	Ability to recognize and protect oneself from physical risks
Touch sense	Sense of touch
Screw movement with arm-hand	Ability to make twisting movement with arm-hand
Rate of action	Ability to do work with a fast pace
Adjusting to production peaks	Ability to work harder than usual or to meet deadlines
Frequent contact with customers	Ability to have contact with customers or clients
Managing others	Ability to do work that involves managing other people
Dealing with conflicts	Ability to cope with conflicts with difficult people
Collaborate	Ability to work in teams Ability to have contact with colleagues
Dealing with patients	Ability to do work that requires care of others (patients)
Hours per week	Time that one can work per week
Hours per day	Time that one can work per day

(Continued)

Table A-1.
Job requirements mapped to functional abilities measured by the Functional Abilities Questionnaire (FML), by study use and job requirement type—*Continued*

Job requirement	Functional ability
Not used for matching in our study	
General	
Minimum age	. . .
Maximum age	. . .
Multidimensional	
Crawling [b]	Ability to be active while kneeling or squatting, Ability to reach the ground by kneeling or squatting
Active while twisted [b]	Ability to be active while bending or twisting, Ability to twist torso, Ability to bend, Frequency of bending throughout work day
Using mouse or keyboard [a]	Ability to use a mouse or keyboard [c]
Unidimensional	
Not being able to fall back on colleagues	Ability to do solitary work [c]

SOURCE: Adapted from UWV (2013).

NOTES: Job requirement type is an author-specific designation not used by the UWV.

. . . = not applicable.

a. Ability to use is not captured by the Health and Functional Capacity Survey (HFCS), therefore only the time spent using during the work day measure is used for matching in our study.

b. Manually evaluated by UWV using indicated functional abilities; omitted from matching in our study because we do not have disability assessors to complete this step.

c. Not in the HFCS.

Table A-2.
Crosswalk of Dutch education levels to U.S. education classifications and aggregated groups

U.S. education classification	Dutch education level
Less than high school	
Kindergarten	1
Grade 1–6	2
Grade 7–9	2
Grade 10–12, no diploma received	3
High school or some college	
High school diploma or equivalent (GED)	5
Some college, but no degree	5
Associate degree in college—occupation or vocational program	5
Associate degree in college—academic program	5
Bachelor's degree or higher	
Bachelor's degree (BA, BS, AB)	6
Master's degree (MA, MS, MEng, MEd, MSW, MBA)	7
Doctoral degree (PhD, ScD, EdD)	7
Professional school degree (MD, DDS, DVM, LLB, JD)	7

SOURCE: Authors' construction using education levels present in the 2019 Health and Functional Capacity Survey (HFCS) and 2018 Dutch job profile data from UWV.

NOTE: The automated preselection algorithm used by the authors applies this mapping between U.S. education classifications and Dutch education levels. The U.S. classifications have no equivalent to Dutch education level 4.

Notes

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[1] In this article, "DI" refers exclusively to U.S. Social Security Disability Insurance. The lowercase term "disability insurance" refers to the general concept and to comparable foreign programs, such as work incapacity insurance in the Netherlands.

[2] Effective January 1, 2006, the WIA replaced the Disablement Insurance Act (Wet op de arbeidsongeschiktheidsverzekering, or WAO) for new beneficiaries. Individuals who were receiving WAO benefits before the transition may remain under that scheme. In this article, both WAO and WIA benefits are considered DI-equivalent benefits.

[3] Not all individuals in this age range are fully insured for DI. For context, about three-fourths of U.S. adults aged 20 to full retirement age meet the Social Security requirements for disability-insured status (SSA 2025).

[4] WIA benefits include both the Return-to-Work Scheme for the Partially Disabled (Werkhervatting Gedeeltelijk Arbeidsgeschikten, or WGA) and the Income Provision Scheme for Fully Occupationally Disabled People (Inkomensvoorziening Volledig Arbeidsongeschikten, or IVA).

[5] Dutch employers can lay off workers who do not meet their obligations under the return-to-work plan, in which case the worker is no longer eligible for disability insurance.

[6] Unlike the United States, the Netherlands has a statutory retirement age (currently 67 years) and allows certain occupations (for example, firefighters) to implement lower maximum age restrictions. However, we do not apply any age restrictions in our analyses.

[7] RAND ALP data and documentation are available at https://alpdata.rand.org.

[8] After adjusting to a common currency using purchasing power parities, the OECD (2023) estimates average annual wages in 2022 were $65,640 in the Netherlands compared with $77,226 in the United States.

[9] Mean actual monthly earnings is calculated from a categorical annual earnings question by taking the median of each category and dividing by 12; for the highest category ("$200,000 or more"), we define the median as $237,500, consistent with the $75,000 range for the preceding category.

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