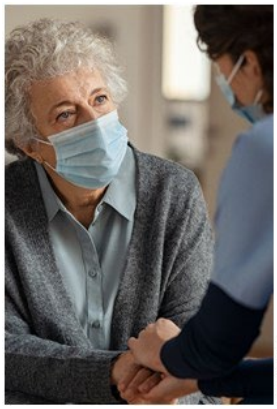


Predictive Models of Adult Protective Services Involvement Among Medicare Beneficiaries in Washington State

John Bauer, PhD • Katie Bittinger, PhD • David Mancuso, PhD • Barbara E.M. Felver, MES, MPA

In collaboration with the Department of Social and Health Services – Aging and Long Term Support Services Adult Protective Services Division.

ADULT PROTECTIVE SERVICES (APS) investigates reports of self-neglect, financial exploitation, neglect (abandonment and non-self-neglect), or abuse (improper use of restraint, mental abuse, physical abuse, or sexual abuse) of vulnerable adults in Washington State.[1] Recent national estimates suggest the prevalence of abuse and neglect, including self-neglect, of vulnerable adults is approximately 10 percent (Acierno et al. 2009), with many cases not reported for investigation (Storey 2020). In Washington State in 2018, the APS program administered by the DSHS Aging and Long-Term Support Administration received 60,038 reports of abuse and neglect. Analysis of the factors associated with increased risk of abuse and neglect can inform forecasts of future investigation volume, help quantify potential underreporting, and identify points of intervention.

This report is part of a series of analyses examining factors associated with the risk of being identified as an alleged or substantiated victim in an APS investigation. This report extends earlier descriptive analyses[2] through the use of predictive modeling to better understand the association between potential risk and protective factors and APS outcomes. This report examines APS experiences among persons enrolled in Medicare, including persons under 65 qualifying for Medicare through disability. Informed by findings from our previous analyses, separate risk models are estimated by age group, allegation type (self-neglect and non-self-neglect), and substantiation status.

In interpreting the results reported here, it is important to note that the identified relationships are not necessarily causal. The statistical association between risk factors and outcomes may reflect:

- The relationship between the condition and the likelihood that an individual would be considered a vulnerable adult eligible for APS services,
- The association with the volume of interactions with health care providers subject to mandated reporting requirements,
- Causal impacts on the risk of APS involvement (as with alcohol abuse and self-neglect), or
- Receipt of treatment as a consequence of abuse or neglect (e.g., emergency department visits).

For example, while it would be reasonable to interpret the significantly increased risk of self-neglect associated with alcohol use disorder to be causal, interpretation of the positive association between skilled nursing home visits and APS involvement is more nuanced.

[1] For more information on the Adult Protective Services program administered in Washington State by the DSHS Aging and Long-Term Support Administration, or to report suspected abuse or neglect, visit https://www.dshs.wa.gov/altsa/adult-protective-services-aps.
[2] Risk Factors for Adult Protective Services Involvement Among Medicare Beneficiaries in Washington State, Bauer, et al. May 2022. https://www.dshs.wa.gov/rda

The need for skilled nursing services is an indicator of increased likelihood that an individual will meet APS vulnerability criteria, and the need for skilled nursing services could be in part a consequence of abuse or neglect. Further, the nurse providing the home visit is a mandated reporter, and, independent of the underlying circumstances of the care receiver, the encounter will increase the likelihood of an APS report. It would be inappropriate to infer that skilled nursing home visits cause abuse or neglect.

Key Findings

1. **Recidivism.** In seven of the eight estimated predictive models, prior APS involvement is the most powerful predictor of future involvement of a Medicare beneficiary as an alleged victim in an APS investigation. Odds ratios are extremely high, ranging between 4.8 and 10.8. Prior APS involvement is a particularly strong predictor of substantiation of subsequent self-neglect allegations.
2. **Poverty.** Indicators of poverty (receipt of Part D subsidies and residential "neighborhood" income proxies) are strongly associated with increased risk of involvement in both self-neglect and other types of APS investigations. Taken together, poverty-related indicators are the second most impactful set of risk factors, after prior APS involvement.
3. **Race/ethnicity.** In most cases where we find statistically significant effects associated with race and ethnicity, the effects are in the direction of reduced risk of involvement in, or substantiation of, APS allegations. One exception to this general result is the finding of increased risk of involvement in, and substantiation of, non-self-neglect allegations for Black and American Indian or Alaska Native beneficiaries age 60 and above.
4. **Mental illness and substance use disorders.** In most cases where we find statistically significant effects associated mental illness and substance use disorders, the effects are in the direction of increased risk of involvement in, or substantiation of, APS allegations. Substance use disorders and schizophrenia and related psychotic disorders are particularly strong risk factors for self-neglect.
5. **Cognitive impairments.** Alzheimer's disease is a significant risk factor for involvement in, and substantiation of, non-self-neglect APS allegations among Medicare beneficiaries age 60 and above. Alzheimer's is associated with reduced risk of involvement in a self-neglect investigation. Traumatic brain injury is a significant risk factor for involvement in, and substantiation of, non-self-neglect APS allegations among Medicare beneficiaries under the age of 60.
6. **Intellectual and developmental disabilities.** Intellectual and developmental disabilities are generally associated with increased risk of involvement in, or substantiation of, non-self-neglect APS allegations among Medicare beneficiaries both under age 60 and age 60 and above.
7. **Functional support needs and frailty indicators.** Many functional and frailty indicators are associated with increased risk of involvement as an alleged victim in an APS investigation. These relationships are strongest in the area of self-neglect among Medicare beneficiaries under 60.
8. **Health service utilization.** Emergency department (ED) and skilled nursing home visits are associated with increased risk of involvement as an alleged victim in an APS investigation.
9. **Physical conditions.** Several chronic health conditions are associated with increased risk of involvement as an alleged victim in an APS investigation, including diabetes, muscular dystrophy, and multiple sclerosis.
10. **Predictive accuracy.** Predictive models of APS involvement performed well based on commonly used measures of predictive accuracy. C-statistics for all models are between 0.82 and 0.90.

Adult Protective Services in Washington State

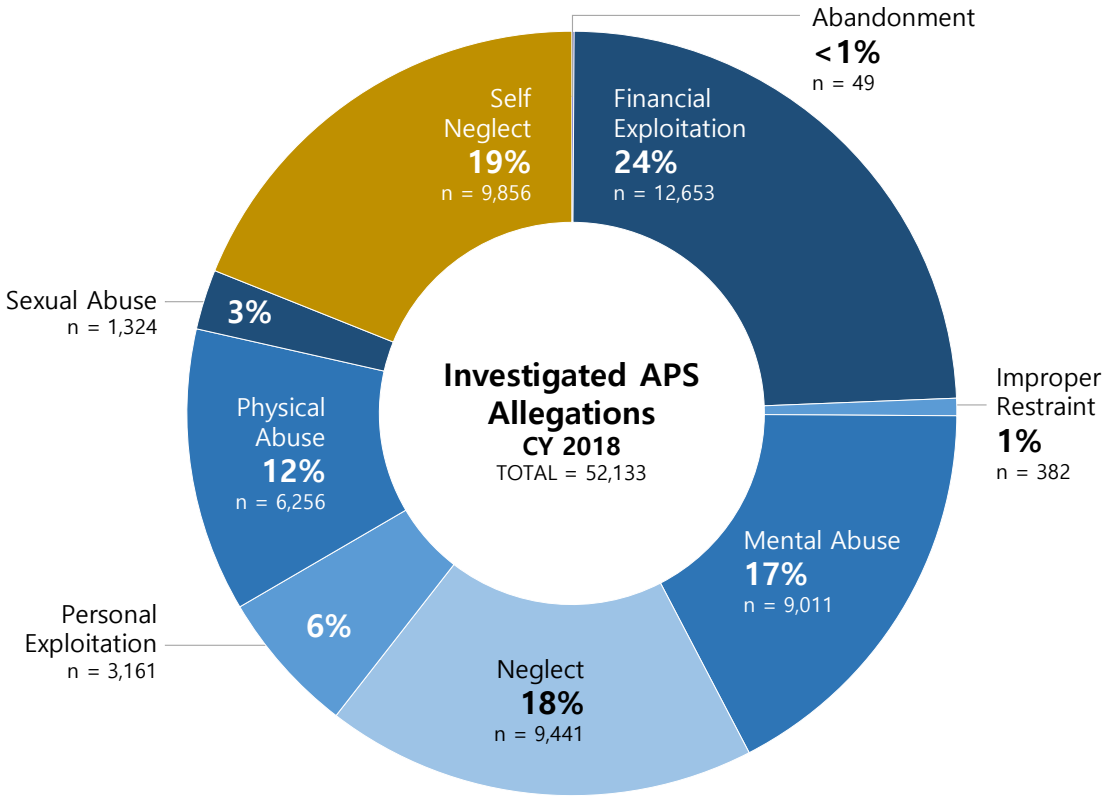
APS receives and investigates reports of abandonment, abuse, financial exploitation, neglect, and self-neglect of vulnerable adults and provides protective services and legal remedies to protect vulnerable adults as described in RCW 74.34. When a report is made, APS intake gathers the initial report information and makes a response within 24 hours. A response may include contacting the reporter, referring the report to the appropriate agency for investigation, screening, or assignment for investigation. When the allegations appear to contain elements of abandonment, abuse, financial exploitation, neglect, or self-neglect; and the alleged victim appears to be a vulnerable adult (per RCW 74.34.020); then APS intake will assign the initial report for investigation. If the initial report is not assigned for investigation, it is screened out from the investigation process and, if warranted, the reporter is provided with potential services and/or resources for the alleged vulnerable adult.

After the initial report is assigned for investigation, APS investigators gather and evaluate information from observations, review of pertinent records, and interviews of key persons including the reporter, alleged victim, alleged perpetrator, and other relevant persons. Investigations should be closed within 90 calendar days of assignment unless necessary investigation or protective services activity extends the investigation. At the conclusion of the investigation, evidence is reviewed and findings are categorized as follows: unsubstantiated, inconclusive, or substantiated.

In 2018, APS received 60,038 reports and conducted 41,953 investigations that reviewed 52,133 allegations. The total count of allegations within a year is always larger than the total number of investigations, as one investigation may include multiple allegations. Figure 1 below shows the distribution of the types of self-neglect (yellow) allegations and non-self-neglect allegations by type (shades of blue) investigated in 2018.

FIGURE 1

APS Allegations in CY 2018



Predictive Model Development

To develop predictive models of risk of APS involvement, it is important to understand the definition of vulnerable adults that underlies eligibility for APS services, and the different categories of abuse and neglect allegations. From this context, we develop a conceptual framework for analyzing relationships between individual characteristics, APS eligibility, and APS outcomes.

Defining Vulnerable Adults

Washington State formally defines vulnerable adults by law (see 74.34 RCW) as:

- An individual who is 60 years of age or older with a functional, mental, or physical inability to care for themselves; OR
- An individual who is over the age of 18 AND
  - Has been found incapacitated OR
  - Has a development disability, including intellectual disabilities, autism, or other similar conditions OR
  - Lives in a DSHS-licensed facility (such as an adult family home, assisted living facility, or nursing home) OR
  - Receives in-home services through a licensed home health, hospice, or home care agency OR
  - Self-directs their own care and receives services from a personal aide.

Given the potential differences in risk factors for abuse and neglect between adults ages 18-59 and elders ages 60 and older under this definition, separate analyses will be conducted for these two populations. We note that other researchers studying risk factors associated with vulnerable adult abuse and neglect also emphasized the importance of studying these populations separately (Lachs et al. 1996, Lachs et al. 1997).

Categories of APS Outcomes

Abuse and neglect allegations are derived from data in the Tracking Incidents of Vulnerable Adults (TIVA) database maintained by the APS division of DSHS. Nine different types of allegations are tracked in TIVA, as indicated in Figure 1 on the preceding page. We calibrate predictive models, separately for adults under 60 and elders age 60 or above, for the following APS outcomes:

- **Any self-neglect allegation:** involved in a self-neglect investigation regardless of finding (other types of neglect are not included).
- **Any substantiated self-neglect allegation:** involved in an investigation with a *substantiated* self-neglect allegation.
- **Any other allegation:** involved as an alleged victim in an investigation with a non-self-neglect allegation such as financial exploitation, neglect (abandonment and non-self-neglect), or abuse (improper use of restraint, mental abuse, physical abuse, personal exploitation, or sexual abuse), regardless of finding.
- **Any substantiated other allegation:** involved as an alleged victim in an investigation with a *substantiated* non-self-neglect allegation including exploitation, neglect, or abuse.

Previous research has indicated that self-neglect should be studied separately from other abuse types (Sommerfeld et al. 2014; Anthony et al. 2009; and Dyer et al. 2007) due to differences between the nature of self-neglect, relative to neglect or abuse that involves a perpetrator. Combining all allegation types into a single category would obscure important differences in risk patterns.

A Conceptual Framework for APS Risk Models

The conceptual model described below provides a framework for interpreting the predictive models provided in this report.

FIGURE 2

Conceptual Adult Protective Service Risk Model

General Population	Vulnerable Adults	Abuse and Neglect Outcomes
1. Demographics and socio-economic status **2. Risk factors** • Physical impairments • Cognitive impairments • Mental illness • Substance Use Disorders (SUD) • Intellectual and Developmental Disabilities (IDD) • Complex medical conditions	**1. Functional, physical, or cognitive impairments** **2. Intellectual and Developmental Disabilities** **3. Receives licensed residential or in-home care, or self-directed care**	**Outcomes** • Any self-neglect allegation • Any substantiated self-neglect allegation • Any other allegation of abuse, neglect, or exploitation) • Any substantiated other allegation

Two main types of models will be estimated using this conceptual framework:

- **Reduced Form Model (A → C)**. This type of model directly estimates the association between risk factors and APS outcomes, without modeling the relationship between those risk factors and the likelihood that the individual would be considered a vulnerable adult eligible to receive services from APS. We present "reduced form" predictive models in the remainder of this report.
- **Vulnerable Adult Model (B → C).** This type of model estimates the association between risk factors and APS outcomes among persons meeting vulnerability criteria. For example, subsequent reporting will examine APS outcomes for persons receiving Medicaid long term support services (LTSS) who, based on their LTSS receipt, meet the vulnerable adult definition in 74.34 RCW.

Subsequent analyses may also consider two-part models (A → B then B → C) that jointly model the relationship between identified risk factors (A) and vulnerability (B) and the relationship between those risk factors and APS outcomes (C) specifically for vulnerable adults (B).

Identifying Risk Factors for Abuse and Neglect among Adult and Elder Medicare Beneficiaries

This analysis is based on APS investigation episodes completed in 2018 that are linked to Medicare beneficiaries. Seventy-eight percent (34,750 of 44,309) of APS episodes[3] completed in 2018 in TIVA were successfully linked to Medicare beneficiaries. Of the linked episodes, 21,211 unique Medicare beneficiaries were identified as having at least one completed APS episode in 2018 (see Table 1).

Only completed episodes with an identified finding (substantiated or non-substantiated) are included in this analysis. Table 2 below details the number of Medicare beneficiaries with and without APS

[3] The count of episodes completed in 2018 (44,309) differs from the previously noted count of investigations opened in 2018 (41,953) because we include investigations completed in 2018 that opened in prior years.

involvement in 2018, by age and allegation type. As indicated in the table, there are vastly higher rates of substantiation for self-neglect allegations, relative to other allegation types. For example, 28 percent of self-neglect APS investigation involving elders were associated with a substantiated self-neglect allegation (1,703 of 6,033), while only 3 percent of other allegation types were substantiated (377 of 13,715). A similar pattern is observed for adults under 60. It is important to note that self-neglect investigations, unlike all other APS allegations, do not involve an alleged perpetrator and are therefore not subjected to the same rigorous due process review as other allegation types. As such, it is not surprising to see a higher percentage of self-neglect cases being substantiated when compared to other types of APS allegations. These observations reinforce the importance of distinguishing between self-neglect and other allegation types in the analyses that follow.

TABLE 1

APS Episode Counts in CY 2018

Episodes	NUMBER
APS episodes completed in CY 2018	44,309
Episodes linked to Medicare beneficiaries	34,750
Medicare beneficiaries with an episode	21,211
Adults (under age 60) with an episode	3,156
Elders (ages 60 and older) with an episode	18,055

TABLE 2

Medicare Beneficiaries With and Without APS Outcomes in CY 2018

Medicare Adults (Under Age 60) With:	NUMBER
No APS allegations	**135,010**
One or more APS allegation(s)	**3,156**
One or more self-neglect allegation(s)	570
One or more other (abuse, neglect, exploitation) allegation(s)	2,762
One or more substantiated APS allegation(s)	**207**
One or more substantiated self-neglect allegation(s)	148
One or more substantiated other (abuse, neglect, exploitation) allegation(s)	106
Medicare Elders (Ages 60 and older) With:	
No APS allegations	**1,310,389**
One or more APS allegation(s)	**18,055**
One or more self-neglect allegation(s)	6,033
One or more other (abuse, neglect, exploitation) allegation(s)	13,715
One or more substantiated APS allegation(s)	**2,063**
One or more substantiated self-neglect allegation(s)	1,703
One or more substantiated other (abuse, neglect, exploitation) allegation(s)	377

Prior research identified APS-involvement risk factors in four general domains: sociodemographic characteristics, physical and behavioral health conditions, functional impairments, and social networks (Lachs et al. 1997; Acierno et al 2010; Ernst et al. 2014; and Gorbien and Eisenstien 2005).

Using these four general domains as guidelines, our predictive models examine demographics (age, gender, race, and ethnicity); socio-economic status indicators (Medicare Part D subsidies, ZIP code-based poverty rates); utilization of disability-related durable medical equipment (DME); diagnosed disabling central nervous system conditions (e.g., Alzheimer's, Multiple Sclerosis); developmental conditions (e.g., intellectual disabilities); sensory, and mobility impairments (e.g., hip fractures, falls); frailty-related diagnoses (e.g., failure to thrive, altered mental status); medical comorbidities (e.g., cardiovascular diseases, diabetes); mental illnesses (e.g., Schizophrenia, bipolar disorder, depression); substance use disorders; and utilization of medical services (e.g., ED visits, hospitalizations, skilled

nursing facility stays). Although Medicare claims and encounter data contain limited information related to the "social network" domain, there is the potential to develop additional risk indicators for this domain from CARE assessment data in future work focused on the Medicaid LTSS population.

Predictive Modeling Framework

Predictive models estimate the probability that an individual will have an APS outcome in the subsequent year. APS outcomes include:

- Any self-neglect allegation,
- Any substantiated self-neglect allegation,
- Any other allegation (abuse, neglect, or exploitation), and
- Any substantiated other allegation.

Tables 3 and 4 in the Appendix provides a complete list of the risk factors that met the significance threshold for reporting in at least one predictive model. Risk factors were derived from:

- Chronic Illness and Disability Payment System (CDPS) and Medicaid-Rx risk groups[4],
- Medicare Master Beneficiary Summary File[5] (MBSF) Condition files,
- MSBF Cost and Utilization files,
- DME code sets from various sources applied to Medicare claims, and
- Frailty codes sets (from various sources) applied to Medicare claims.

There is some overlap between the CDPS and MSBF condition categories. The CDPS groups often distinguish between the severity of a condition (e.g., diabetes low and medium). The MBSF conditions are often more specific (e.g., schizophrenia vs "psychiatric high"). The MRX indicators, based on drug NDC codes, have the advantage of identifying treated conditions based on primary on-label usage.

Risk indicators are primarily derived from Medicare enrollment and claims data for Washington residents. These data include: fee-for-service claim files (inpatient, outpatient, SNF, carrier, home health, DME), the Medicare Master Beneficiary Summary Files (MSBF Base, Chronic Condition, Other Condition, Cost and Utilization), and Part D claims.

The Medicare data do not include information on household income. We used two income proxies in our analysis: Medicare Part D Subsidy receipt reported in the MSBF files and ZIP code based income data, linked to beneficiaries by residential ZIP code. Part D prescription drug coverage subsidies are for eligible low-income Medicare beneficiaries. The zip-code based income proxies (percent of families below the federal poverty line, percent of households with incomes above $100,000) are based on American Community Survey data for census tracts, which we link to beneficiary zip codes, using weighted crosswalks between tracts and zip-code areas. We also examine Z-code diagnoses associated with limited economic resources (e.g., low-income, homeless, lack of adequate food). Z-codes are used to record factors that affect health status and health care services. These indicators sometimes have significant effects in our models, but these diagnoses are likely significantly underreported. In addition to providing current outcomes, we used TIVA data to develop indicators of prior APS episodes. Having a prior APS episode is strongly associated with risk of a subsequent episode, as we discuss below.

Predictive models assess the effects of risk factors, measured in a base year, on APS outcomes in the next year. The models use three base-year/outcome-year pairs: 2015-2016, 2016-2017, and 2017-2018. We estimate separate models for adults (under age 60) and elders (age 60 and older). Models for

[4] More information about CDPS and Medicaid-Rx risk groups is provided in the Technical Notes at the end of this report.
[5] More information about the Medicare Master Beneficiary Summary File is provided in the Technical Notes at the end of this report.

adults are based on 320,275 base-year/outcome-year pairs. Models for elders are based on 2,192,500 base-year/outcome-year pairs.

The models are estimated using logistic regression, with machine learning techniques (backward stepwise selection) used to identify which predictors provide the best fit. The estimated models have a high degree of predictive accuracy, with C-statistics ranging from 0.823 to 0.896. The C-statistic is a widely used measure of predictive accuracy for logistic regression models. The higher the C-statistic, the better the model can discriminate between subjects who experience the outcome of interest and subjects who do not. More information about the interpretation of the C-statistic is provided in the Technical Notes at the end of this report.

Select Findings

Odds ratios from the estimated predictive models are summarized in the figures that follow and reported in Tables 3 and 4 in the Appendix. The figures are designed to convey the magnitude and directionality of the relationship between different characteristics and APS outcomes. In particular, the figures indicate the interpretation of the magnitude of odds ratios that take a value of less than one. For example, an odds ratio of 0.5 has the equivalent magnitude of an odds ratio of 2.0, but in the direction of reduced risk of the outcome. Risk factors are reported in the figures below if they are statistically significant at the 90 percent level and are associated with an effect on the odds of the outcome of at least 20 percent. Given the extremely large number of observations available for analysis, even small effect sizes may be statistically significant. Setting a minimum effect-size threshold for reporting helps focus the discussion on factors with a stronger association with APS involvement.

Note that as shown in Figure 11 below, in seven of the eight estimated predictive models, prior APS involvement is by far the most powerful predictor of future involvement of a Medicare beneficiary as an alleged victim in an APS investigation. We report odds ratios associated with prior involvement in an APS investigation in a separate figure to avoid attenuating the visual impact of other important characteristics and risk factors in Figures 3 through 10.

What Is an Odds Ratio?

EXAMPLE: In a hypothetical population, 5 percent of persons with an alcohol use disorder were involved in a self-neglect investigation, compared to 3 percent of persons without an alcohol use disorder.

- **Odds Ratio = (0.05/(1-0.05))/(0.03/(1-0.03)) = 1.7**

In this hypothetical population, the odds of being involved in a self-neglect allegation is 70 percent higher for persons with an alcohol use disorder, relative to persons without an alcohol use disorder. Note that the odds ratios reported below are regression-adjusted to identify the independent association between individual risk factors and APS outcomes.

It is important to note that the relationships reported here are not necessarily causal. The statistical association between risk factors and outcomes may reflect:

- The relationship between the condition and the likelihood that an individual would be considered a vulnerable adult eligible for APS services,
- The relationship between the condition and the volume of interactions with health care providers subject to mandated reporting requirements,
- Causal impact of the condition on the risk of APS involvement (e.g., alcohol use disorder increasing the risk of self-neglect), or
- Receipt of treatment as a consequence of the experience of abuse or neglect (e.g., ED utilization or receipt of skilled nursing home visits).

Models of Self-Neglect for Medicare Elders Age 60 and Above (Figures 2 and 3)

Physical conditions. Among elders age 60 and above, muscular dystrophy, skin conditions, multiple sclerosis, end stage renal disease, diabetes, and chronic obstructive pulmonary disease (COPD) are associated with increased risk of involvement in an APS self-neglect investigation (Figure 3). Skin conditions are primarily non-pressure chronic ulcers of the feet and legs, likely caused by vascular diseases and diabetes. Receipt of opioids and certain cancer diagnoses are associated with lower risk of involvement in an APS self-neglect investigation. With regard to *substantiated* allegations of self-neglect among Medicare beneficiaries age 60 and above, congestive heart failure, COPD, cirrhosis, diabetes, and skin conditions are associated with increased risk (Figure 4), Conditions associated with reduced risk of a substantiated self-neglect allegation including atrial fibrillation, peripheral vascular disease, cystic fibrosis, Parkinson's, gastrointestinal conditions, and receipt of pain medication.

Behavioral health conditions. Mental health conditions, including schizophrenia, bipolar disorder, depression, and anxiety are associated with both increased risk of involvement in, and substantiation of, APS self-neglect allegations. Alcohol use disorders, opioid use disorders, and other drug use disorders are associated with both increased risk of involvement in, and substantiation of, APS self-neglect allegations. The impact of alcohol use disorders on APS involvement is particularly noteworthy.

Cognitive conditions. Alzheimer's disease and intellectual disabilities are associated with substantially *reduced* risk of involvement in a self-neglect investigation among Medicare elders age 60 and above. As we will see later in Figures 6 and 7, Alzheimer's and intellectual and developmental disabilities are associated with significantly *increased* risk of involvement as an alleged victim in other non-self-neglect APS allegations. The recognition of the impact of cognitive impairment on the agency of the individual in providing self-care may explain why these risk factors are associated with reduced risk of involvement in self-neglect investigations, but increased involvement in other types of APS allegations.

Functional limitations and frailty indicators. A history or falls, weight loss, and pressure ulcers are associated with increased risk of involvement in an APS self-neglect investigation. Use of breathing aids is associated with reduced risk.

Health service utilization. Use of outpatient ED services and inpatient admissions associated with ED activity are associated with increased risk of involvement in an APS self-neglect investigation, and increasing risk of substantiation. Skilled nursing home visits are also associated with increased risk of involvement in an APS self-neglect investigation, and increasing risk of substantiation. It is important to note that it would be inappropriate to infer that skilled nursing home visits cause abuse or neglect. Rather, the need for skilled nursing services is an indicator of increased likelihood that an individual will meet APS vulnerability criteria, and the need for skilled nursing services could be in part a consequence of abuse or neglect. Further, the nurse providing the home visit is a mandated reporter, and, independent of the underlying circumstances of the care receiver, the encounter will increase the likelihood of an APS report.

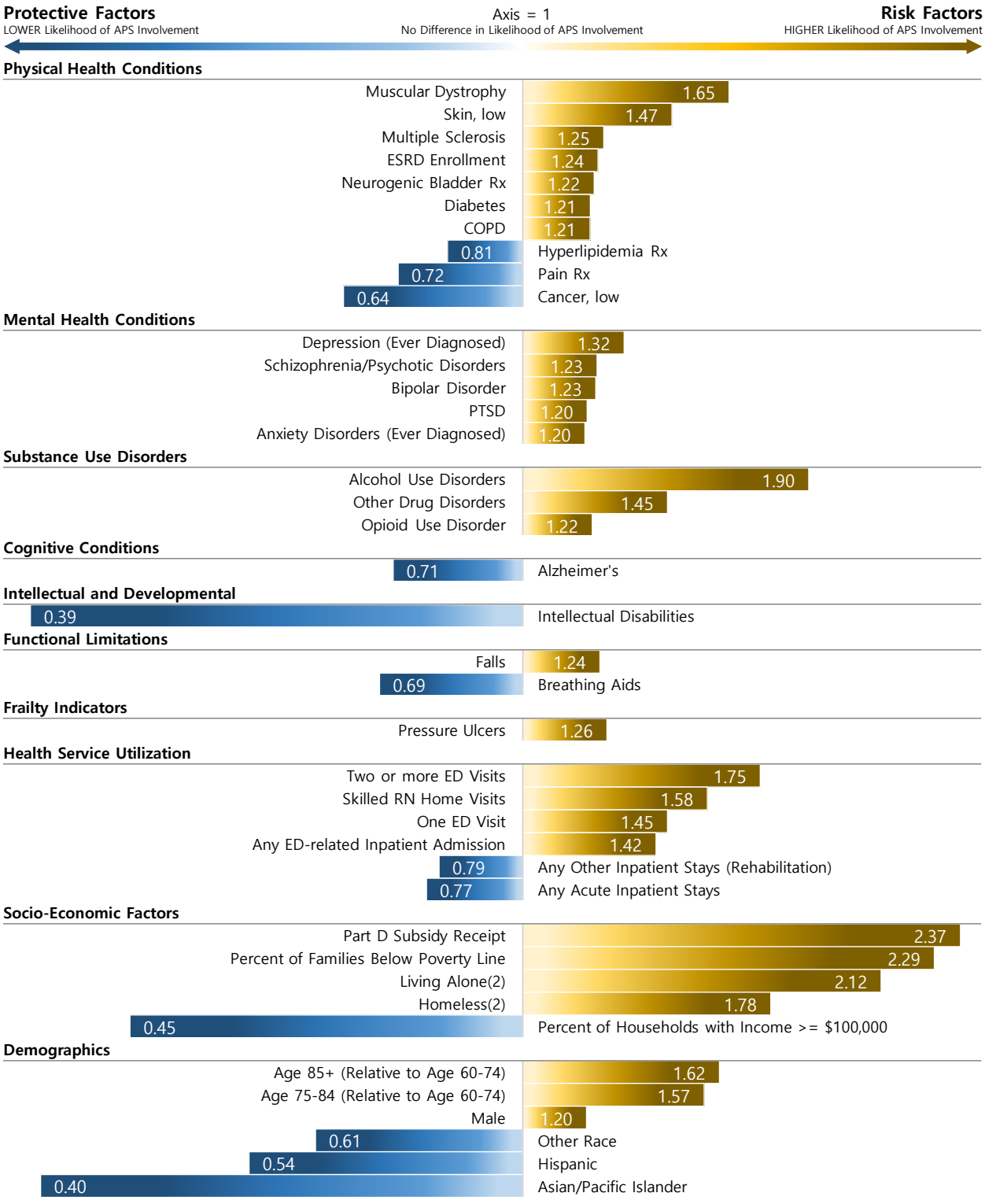
Socioeconomic factors. Poverty is strongly associated with the risk of self-neglect. This can be seen in the effects associated with receipt of Medicare Part D subsidies that are available to persons with lower income, and also in the economic characteristics of a Medicare beneficiary's area of residence, as measured by the percent of families living below the poverty line or with incomes above $100,000. Experiencing homelessness and living alone are also strongly correlated with the risk of involvement in an APS self-neglect investigation, and substantiation of the self-neglect allegation.

Demographics. Medicare beneficiaries age 75 and above are at increased risk of involvement in an APS self-neglect investigation, and substantiation of the self-neglect allegation. Relative to the experience of White non-Hispanic Medicare beneficiaries, Asian/Pacific Islander and Hispanic beneficiaries have lower risk of involvement in APS self-neglect investigations.

FIGURE 3

Elders (60+) Self-Neglect Allegation

SELECTED ADJUSTED ODDS (1)

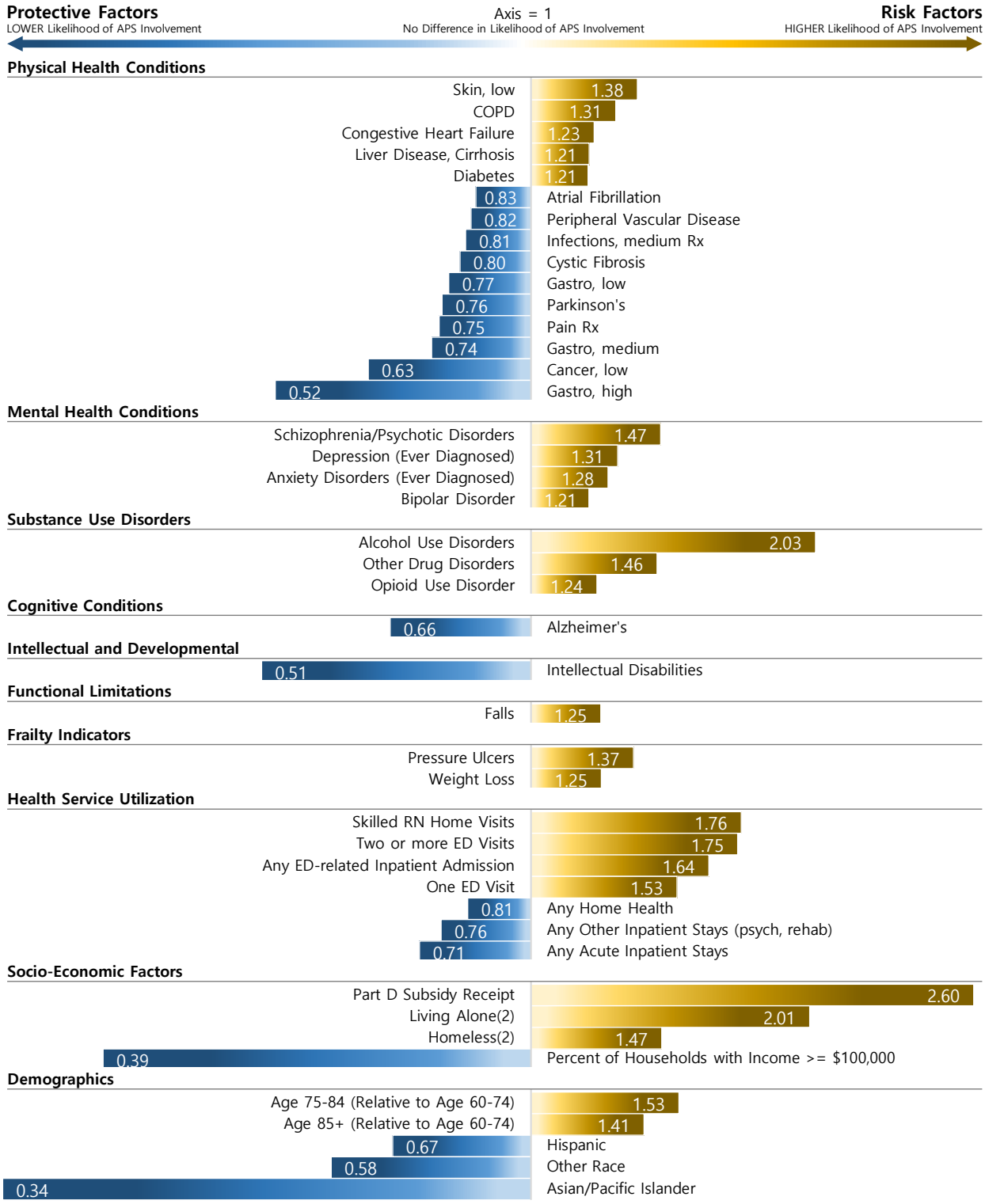


(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

FIGURE 4

Elders (60+) Substantiated Self-Neglect Allegation

SELECTED ADJUSTED ODDS (1)



(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

Models of Self-Neglect for Adults Under 60

Physical conditions. Among Medicare adults under 60, muscular dystrophy, Parkinson's, HIV/AIDS, multiple sclerosis, diabetes, and chronic kidney disease are associated with increased risk of involvement in an APS self-neglect investigation (Figure 5). Epilepsy, certain pulmonary conditions, acute myocardial infarction, and gastrointestinal conditions are associated with lower risk of involvement in an APS self-neglect investigation. With regard to *substantiated* allegations of self-neglect among Medicare adults under 60, sickle cell disease, high-impact pulmonary conditions, diabetes, bladder conditions, and congestive heart failure are associated with increased risk (Figure 6).

Behavioral health conditions. Schizophrenia and other psychotic disorders are associated with both increased risk of involvement in, and substantiation of, APS self-neglect allegations among Medicare adults under 60. Alcohol use disorders, opioid use disorders, and other drug use disorders are associated with increased risk of involvement in an APS self-neglect investigation. Alcohol use disorders and (non-opioid) other drug use disorders are associated with increased risk of *substantiated* allegations of self-neglect among Medicare adults under 60.

Cognitive conditions. Alzheimer's disease is associated with substantially *reduced* risk of involvement in a self-neglect investigation among Medicare adults under 60. Other development delays (excluding autism spectrum disorders, intellectual disabilities, and learning disabilities) are associated with both increased risk of involvement in, and substantiation of, APS self-neglect allegations among Medicare adults under 60.

Functional limitations and frailty indicators. Several indicators are associated with increased risk of a self-neglect allegation and/or substantiation, including diagnoses of spinal cord injury, hip/pelvic fracture, falls, pressure ulcers, abnormal gait, failure to thrive, incontinence, and altered mental status.

Health service utilization. Skilled nursing home visits are associated with increased risk of involvement in an APS self-neglect investigation, and increasing risk of substantiation. As previously noted, it would be inappropriate to infer that skilled nursing home visits cause abuse or neglect. Rather, the need for skilled nursing services is an indicator of increased likelihood that an individual will meet APS vulnerability criteria, and could be a consequence of abuse or neglect. Further, the nurse providing the home visit is a mandated reporter, and, independent of the underlying circumstances of the care receiver, the encounter will increase the likelihood of an APS report.

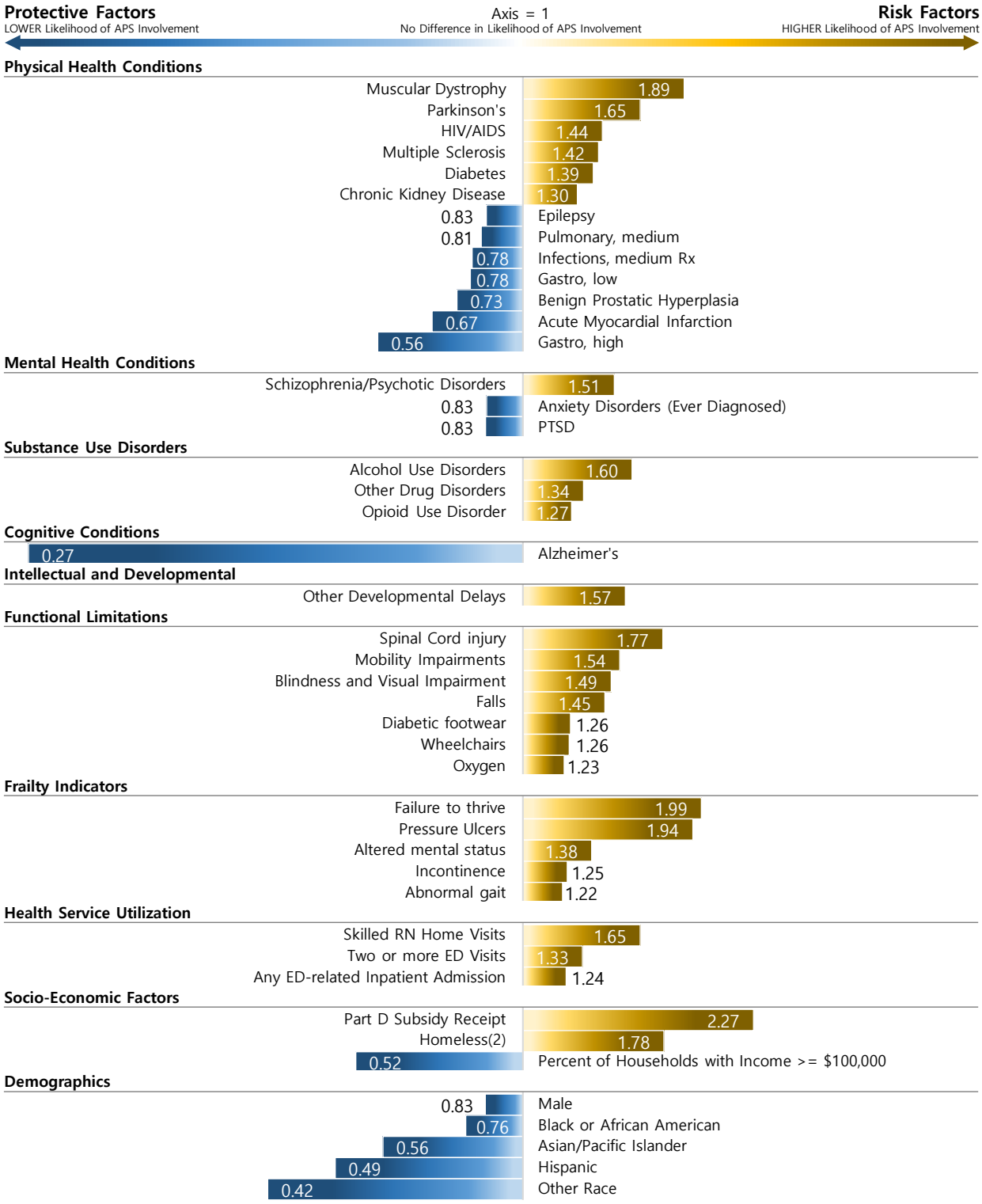
Socioeconomic factors. Poverty is strongly associated with the risk of self-neglect among Medicare beneficiaries under the age of 60, as indicated by the effects associated with receipt of Medicare Part D subsidies and the economic characteristics of a Medicare beneficiary's area of residence. Living alone is also strongly correlated with the risk of involvement in an APS self-neglect investigation, and substantiation of the self-neglect allegation.

Demographics. Relative to the experience of White non-Hispanic Medicare beneficiaries under the age of 60, Hispanic, Asian/Pacific Islander, and Black or African American beneficiaries have lower risk of involvement in APS self-neglect investigations. Hispanic beneficiaries have a significantly lower risk or a substantiated self-neglect allegation.

FIGURE 5

Adults (<60) Self-Neglect Allegation

SELECTED ADJUSTED ODDS (1)

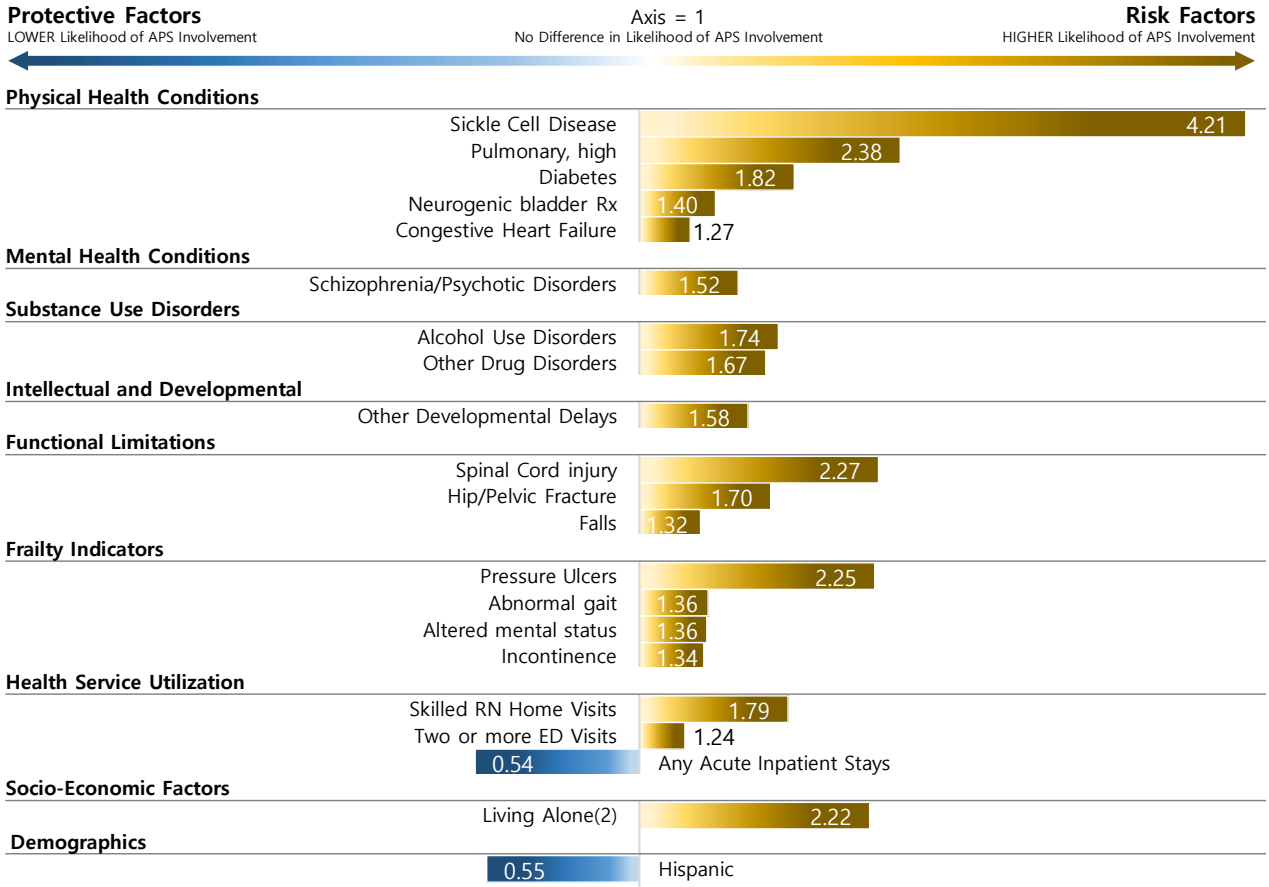


(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

FIGURE 6

Adults (<60) Substantiated Self-Neglect Allegation

SELECTED ADJUSTED ODDS [1]



(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

Models of Other APS Allegations for Elders Age 60 and Above

Physical conditions. Among elders age 60 and above, multiple sclerosis, cerebral palsy, Parkinson's disease, end stage renal disease, and skin conditions are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation (Figure 7). Spina bifida and certain cancer diagnoses are associated with lower risk of involvement as an alleged victim in a non-self-neglect APS investigation. With regard to *substantiated* non-self-neglect allegations among Medicare beneficiaries age 60 and above, multiple sclerosis, pulmonary conditions, epilepsy, diabetes, and chronic kidney disease are associated with increased risk (Figure 8). Conditions associated with reduced risk of a substantiated non-self-neglect allegation including high-risk cancer diagnoses and infections and receipt of pain medication.

Behavioral health conditions. Mental health conditions, including schizophrenia, depression, and post-traumatic stress disorder (PTSD) are associated with both increased risk of involvement in, and/or substantiation of, APS non-self-neglect allegations. Alcohol use disorders, opioid use disorders, and other drug use disorders are associated with both increased risk of involvement in, and/or substantiation of, APS non-self-neglect allegations.

Cognitive conditions. Alzheimer's disease, traumatic brain injury, and intellectual and developmental disabilities are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation among Medicare elders age 60 and above. Among these risk factors, Alzheimer's and other development delays (excluding autism spectrum disorder, intellectual disabilities, and learning disabilities) are also associated with increased risk of substantiation of a non-self-neglect APS allegation.

Functional limitations and frailty indicators. Fall risk and mobility limitations are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation, and substantiation of the associated allegations.

Health service utilization. Use of outpatient Emergency Department (ED) services is associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation, and increasing risk of substantiation.

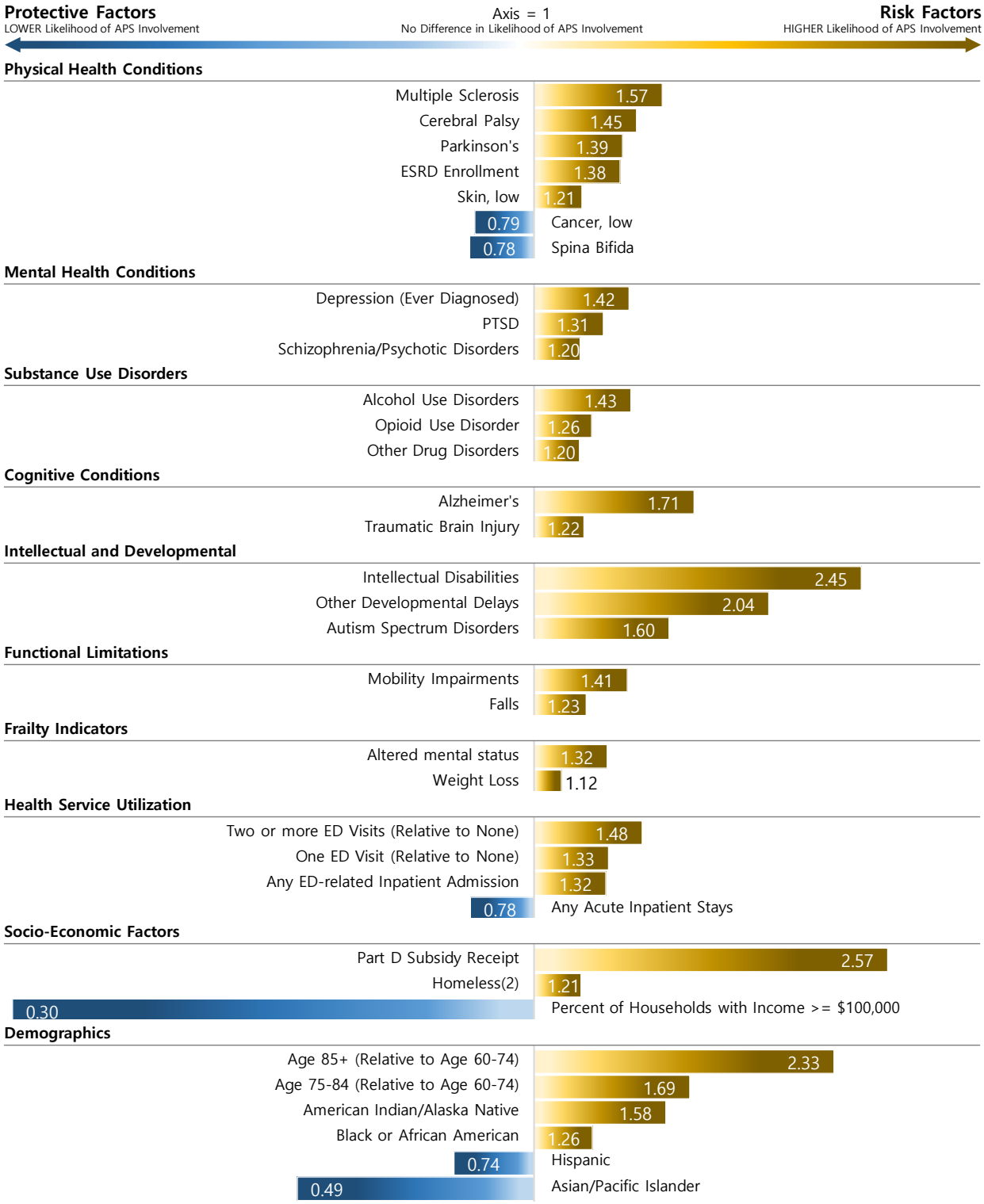
Socioeconomic factors. Poverty is strongly associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation. This can be seen in the effects associated with receipt of Medicare Part D subsidies that are available to persons with lower income, and also in the economic characteristics of a Medicare beneficiary's area of residence, as measured by the percent of families with incomes above $100,000. Living alone is also correlated with substantiation of a non-self-neglect allegation.

Demographics. Medicare beneficiaries age 75 and above are at increased risk of involvement as an alleged victim in a non-self-neglect APS investigation, and substantiation of the non-self-neglect allegation. Relative to the experience of White non-Hispanic Medicare beneficiaries, Asian/Pacific Islander and Hispanic beneficiaries have lower risk of involvement as an alleged victim in a non-self-neglect APS investigation, while Black or African-American and American Indian/Alaska Native beneficiaries are at increased risk.

FIGURE 7

Elders (60+) Other APS Allegation

SELECTED ADJUSTED ODDS (1)

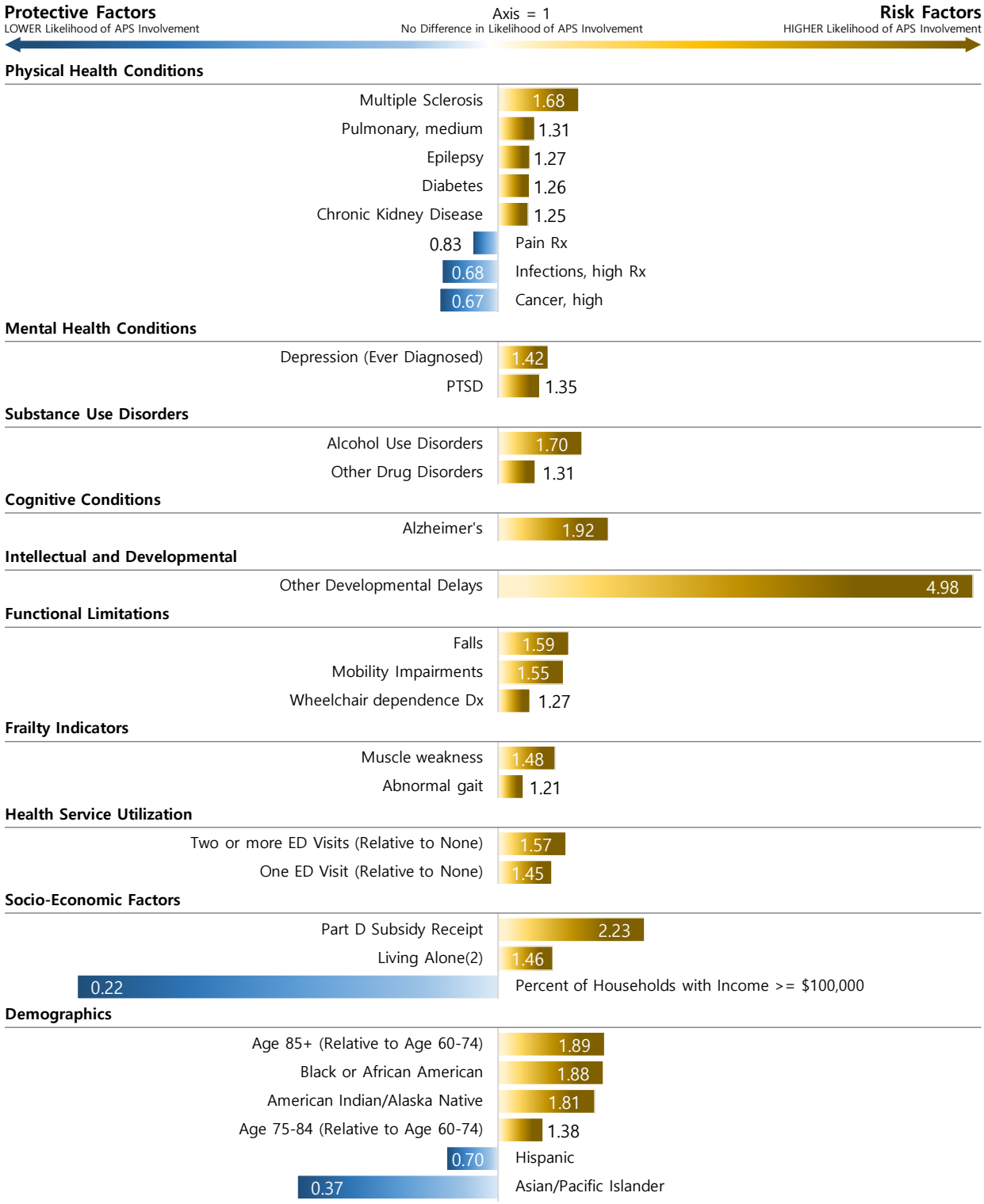


(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

FIGURE 8

Elders (60+) Substantiated Other APS Allegation

SELECTED ADJUSTED ODDS (1)



(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

Models of Other APS Allegations for Adults Under 60

Physical conditions. Among Medicare beneficiaries under age 60, bladder conditions, epilepsy, muscular dystrophy, peripheral vascular disease, and high-risk skin conditions are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation (Figure 9). Chronic pain, headaches, high-risk infections, and end stage renal disease (ESRD) are associated with lower risk of involvement as an alleged victim in a non-self-neglect APS investigation. With regard to *substantiated* non-self-neglect allegations among Medicare beneficiaries age 60 and above, muscular dystrophy is most strongly associated with increased risk (Figure 10).

Behavioral health conditions. Psychotic disorders including schizophrenia are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation among Medicare beneficiaries under age 60. Anxiety is associated with increased risk of substantiation. Alcohol use disorders are associated with a significantly *reduced* risk of substantiation of non-self-neglect APS allegations.

Cognitive conditions. Alzheimer's disease, traumatic brain injury, and intellectual and developmental disabilities are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation among Medicare beneficiaries under age 60. Among these risk factors, traumatic brain injury, autism spectrum disorder, intellectual disabilities, and other developmental delays are also associated with increased risk of substantiation of a non-self-neglect APS allegation.

Functional limitations and frailty indicators. Many types of functional limitations and frailty indicators are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation, including use of a hospital bed or wheelchair, mobility impairment, vision impairment, and hearing impairment. Mobility impairment and a history of falls are associated with increased risk of substantiation of the associated allegations.

Health service utilization. Skilled nursing home visits are associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation among Medicare beneficiaries under age 60, and increased risk of substantiation of the associated allegations.

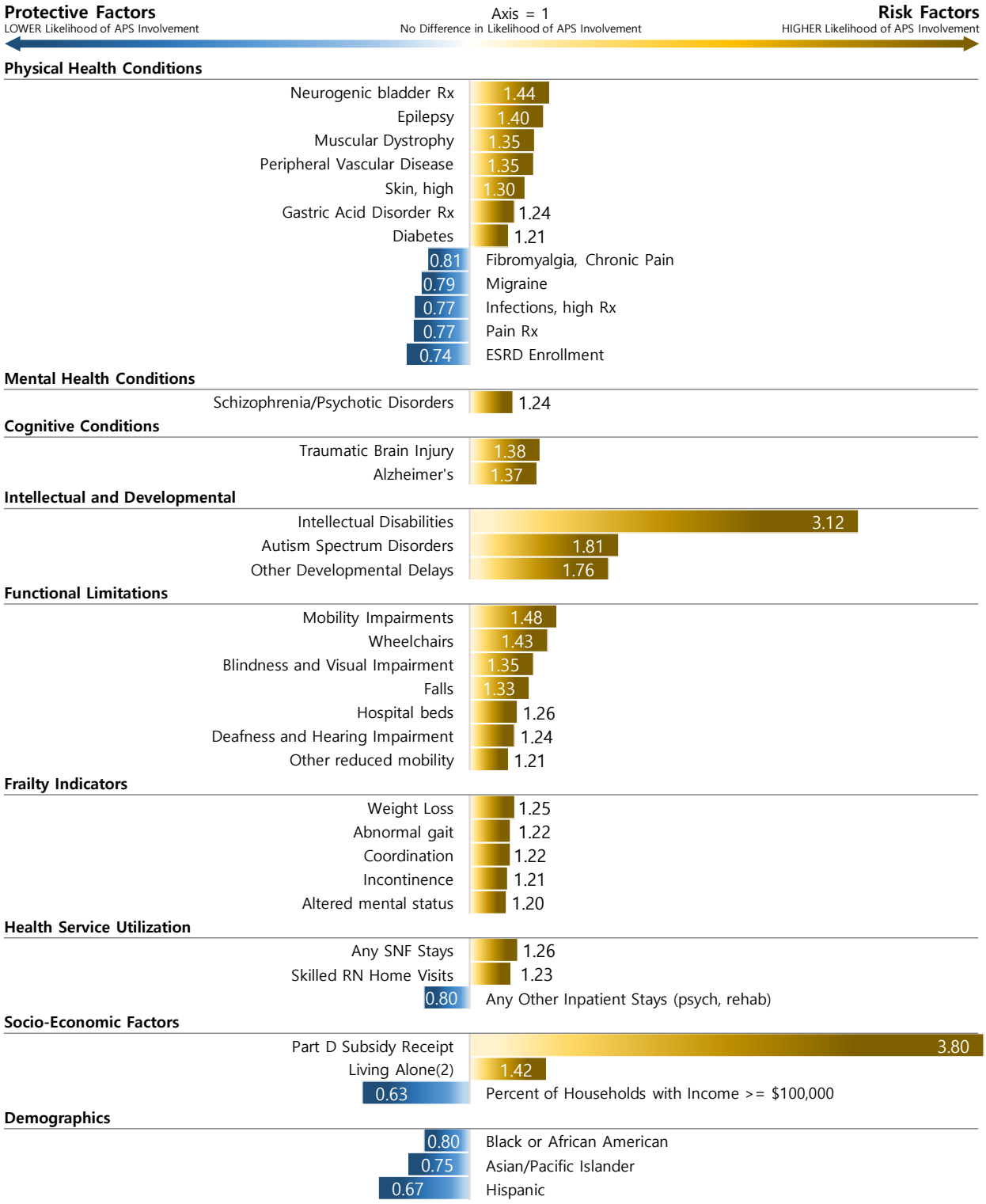
Socioeconomic factors. Poverty is strongly associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation. This can be seen in the effects associated with receipt of Medicare Part D subsidies that are available to persons with lower income, and also in the economic characteristics of a Medicare beneficiary's area of residence, as measured by the percent of families with incomes above $100,000. Living alone is also associated with increased risk of involvement as an alleged victim in a non-self-neglect APS investigation. Part D subsidy receipt is also strongly associated with the likelihood of substantiation.

Demographics. Relative to the experience of White non-Hispanic Medicare beneficiaries under the age of 60, Hispanic, Asian/Pacific Islander, and Black or African-American Medicare beneficiaries have lower risk of involvement as an alleged victim in a non-self-neglect APS investigation.

FIGURE 9

Adults (<60) Other APS Allegation

SELECTED ADJUSTED ODDS (1)

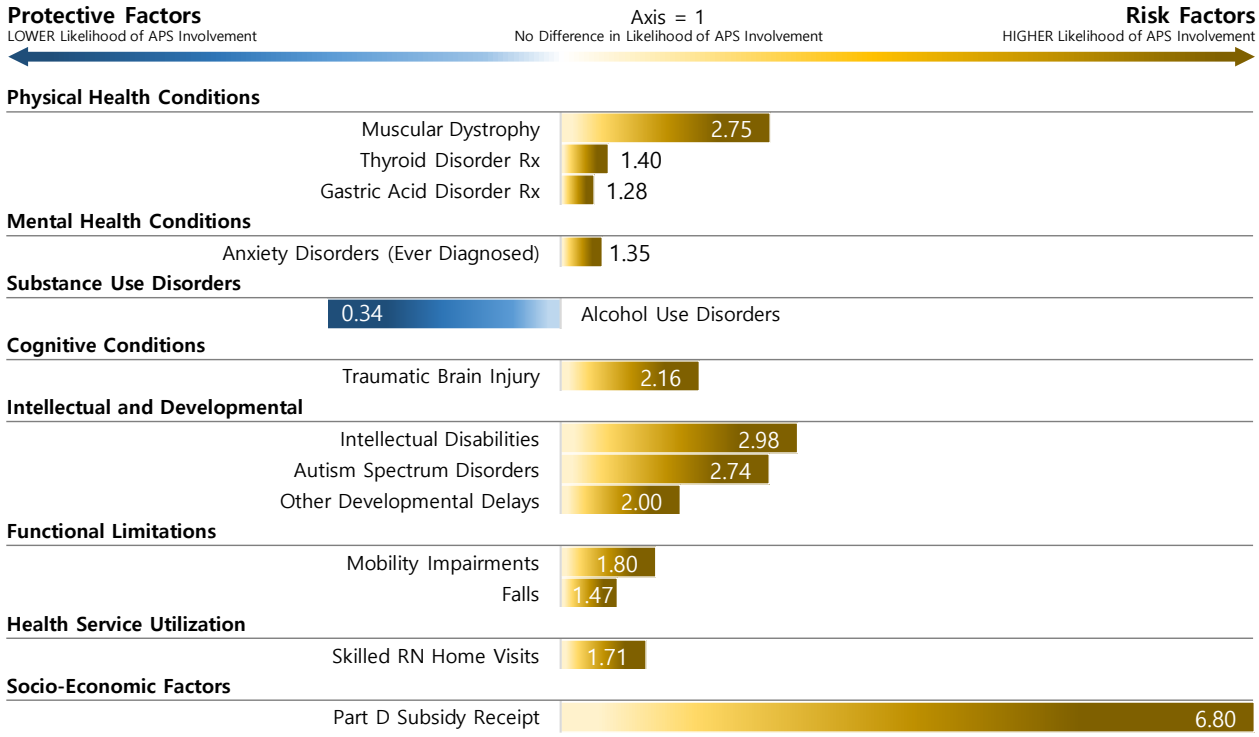


(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

FIGURE 10

Adults (<60) Substantiated Other APS Allegation

SELECTED ADJUSTED ODDS [1]



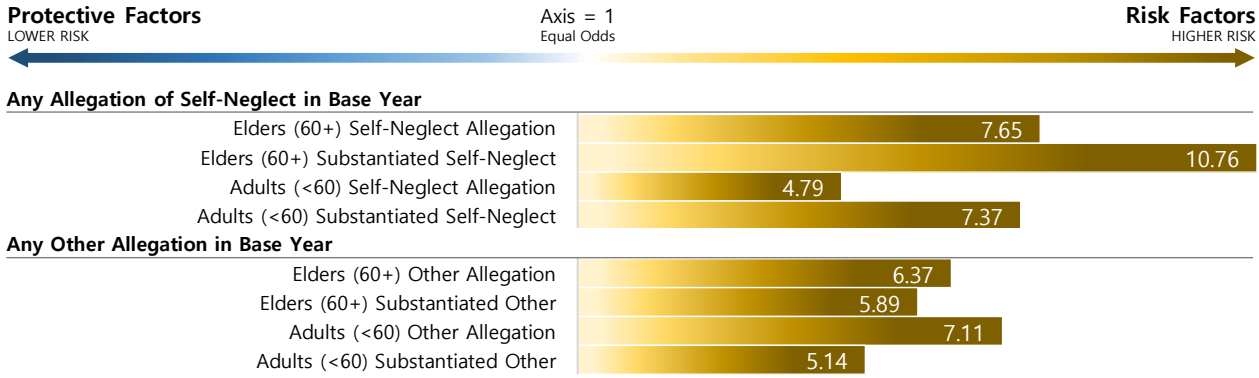
(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

Recidivism

In seven of eight models, prior APS involvement is the most powerful predictor of future involvement as an alleged or substantiated victim in an APS investigation (Figure 11). This indicates that recidivism is common in the APS delivery system, and there is a relatively high probability of a subsequent referral for alleged victims in completed APS investigations that do not result in substantiation. Prior APS involvement is a particularly strong predictor of substantiation of subsequent self-neglect allegations, with odds ratios of 10.76 and 7.37 for elders age 60 plus and adults under 60 respectively.

FIGURE 11

Odds Ratios Associated with Any Allegation in Base Year



Discussion

As highlighted in the introduction, it is important to recognize that the identified relationships between risk factors and outcomes are not necessarily causal. Statistical associations may reflect (a) the relationship between the condition and the likelihood that an individual would be considered a vulnerable adult eligible for APS services, (b) the association with the volume of interactions with health care providers subject to mandated reporting requirements, (c) causal impacts on the risk of APS involvement (as with the impact of alcohol abuse on the risk of self-neglect), or (d) receipt of treatment as a consequence of abuse or neglect (e.g., ED or skilled nursing home visits).

Across the set of APS predictive models there are some common themes. In seven of the eight models, prior APS involvement is the most powerful predictor of future involvement of a Medicare beneficiary as an alleged victim in an APS investigation. Prior APS involvement is a particularly strong predictor of substantiation of subsequent self-neglect allegations.

Indicators of poverty (receipt of Part D subsidies and "neighborhood" income proxies) are strongly associated with increased risk of involvement in both self-neglect and other types of APS investigations. Taken together, poverty-related indicators are the second most impactful set of risk factors, after prior APS involvement.

In most cases where we find significant effects associated with race or ethnicity, the effects are in the direction of reduced risk of involvement in, or substantiation of, APS allegations. An exception to this general result is the finding of increased risk of involvement in, and substantiation of, non-self-neglect allegations for Black and American Indian or Alaska Native beneficiaries age 60 and above.

In most cases where we find statistically significant effects associated mental illness and substance use disorders, the effects are in the direction of increased risk of involvement in, or substantiation of, APS allegations. Substance use disorders and schizophrenia and related psychotic disorders are particularly strong risk factors for self-neglect.

In terms of conditions related to cognitive impairments, Alzheimer's disease is a significant risk factor for involvement in, and substantiation of, non-self-neglect APS allegations among Medicare beneficiaries age 60 and above. Alzheimer's is associated with reduced risk of involvement in a self-neglect investigation. Traumatic brain injury is a significant risk factor for involvement in, and substantiation of, non-self-neglect APS allegations among Medicare beneficiaries under the age of 60. Intellectual and developmental disabilities are generally associated with increased risk of involvement in, or substantiation of, non-self-neglect APS allegations among Medicare beneficiaries both under age 60 and age 60 and above.

Many functional and frailty indicators are associated with increased risk of involvement as an alleged victim in an APS investigation. These relationships are strongest in the area of self-neglect among Medicare beneficiaries under 60. In contrast, chronic health conditions have a more varied (positive or negative) association with risk of APS involvement. We note that diabetes, muscular dystrophy, and multiple sclerosis tend to be associated with increased risk of involvement as an alleged victim in an APS investigation. Finally, we note that ED use and receipt of skilled nursing home visits are associated with increased risk of involvement as an alleged victim in an APS investigation.

The next phase of this work will examine APS outcomes for persons receiving Medicaid LTSS who, based on their LTSS receipt, meet the vulnerable adult definition in 74.34 RCW. Focusing on this population will allow us to leverage additional information about beneficiary circumstances collected through the CARE assessment tool, including more detailed information about cognitive impairment, behavioral challenges, functional support needs, health status, and living arrangements.

TABLE 3

Self-Neglect APS Model Summary

Selected Adjusted Odds[1]

	ELDERS (60+)		ADULTS (<60)	
	SELF-NEGLECT ALLEGATION	SUBSTANTIATED SELF-NEGLECT	SELF-NEGLECT ALLEGATION	SUBSTANTIATED SELF-NEGLECT
Prior APS Involvement				
Any Allegation in Base Year	7.648	10.763	4.794	7.368
Physical Health Conditions				
Parkinson's		0.757	1.648	
Epilepsy			0.832	
Multiple Sclerosis	1.254		1.418	
Muscular Dystrophy	1.647		1.891	
Diabetes	1.212	1.206	1.389	1.820
Acute Myocardial Infarction			0.666	
Hyperlipidemia Rx	0.809			
Atrial Fibrillation		0.834		
Congestive Heart Failure		1.228		1.269
Peripheral Vascular Disease		0.822		
ESRD Enrollment	1.236			
Neurogenic bladder Rx	1.224			1.403
Chronic Kidney Disease			1.301	
Liver Disease, Cirrhosis		1.210		
HIV/AIDS			1.439	
Gastro, high		0.520	0.555	
Gastro, low		0.771	0.775	
Gastro, medium		0.736		
Infections, medium Rx		0.809	0.781	
Cystic Fibrosis		0.796		
Sickle Cell Disease				4.210
COPD	1.211	1.306		
Pulmonary, high				2.381
Pulmonary, medium			0.813	
Skin, low	1.468	1.384		
Cancer, low	0.640	0.630		
Pain Rx	0.719	0.751		
Benign Prostatic Hyperplasia			0.733	
Mental Health Conditions				
Anxiety Disorders (Ever Diagnosed)	1.195	1.278	0.833	
Bipolar Disorder	1.229	1.209		
Depression (Ever Diagnosed)	1.318	1.313		
Schizophrenia/Psychotic Disorders	1.233	1.468	1.505	1.523
PTSD	1.202		0.829	
Substance Use Disorders				
Alcohol Use Disorders	1.897	2.027	1.603	1.736
Opioid Use Disorder	1.218	1.238	1.269	
Other Drug Disorders	1.454	1.455	1.335	1.669
Cognitive Conditions				
Alzheimer's	0.711	0.663	0.268	
Intellectual and Developmental				
Intellectual Disabilities	0.393	0.507		

	ELDERS (60+)		ADULTS (<60)	
	SELF-NEGLECT ALLEGATION	SUBSTANTIATED SELF-NEGLECT	SELF-NEGLECT ALLEGATION	SUBSTANTIATED SELF-NEGLECT
Other Developmental Delays			1.566	1.575
Functional Limitations				
Breathing aids	0.690			
Diabetic footwear			1.263	
Oxygen			1.228	
Wheelchairs			1.256	
Mobility Impairments			1.535	
Spinal Cord injury			1.773	2.266
Falls	1.242	1.252	1.453	1.324
Hip/Pelvic Fracture				1.695
Blindness and Visual Impairment			1.488	
Frailty Indicators				
Abnormal gait			1.219	1.364
Failure to thrive			1.986	
Altered mental status			1.380	1.357
Incontinence			1.245	1.341
Weight Loss		1.254		
Pressure Ulcers	1.264	1.370	1.939	2.246
Health Service Utilization				
One ED Visit	1.454	1.527		
Two or more ED Visits	1.745	1.746	1.329	1.241
Any Acute Inpatient Stays	0.768	0.713		
Any Other Inpatient Stays (psych, rehab)	0.792	0.755		0.535
Any Home Health		0.814		
Any ED-related Inpatient Admission	1.418	1.642	1.239	
Skilled RN Home Visits	1.579	1.759	1.648	1.787
Socio-Economic Factors				
Part D Subsidy Receipt	2.373	2.598	2.274	2.733
% Families Below Poverty Line	2.291			
% Households with Income >= $100,000	0.448	0.393	0.520	
Homeless(2)	1.778	1.472		
Living Alone(2)	2.124	2.006	1.779	2.219
Demographics				
Age 75-84 (Relative to Age 60-74)	1.569	1.534		
Age 85+ (Relative to Age 60-74)	1.617	1.408		
Male	1.200		0.828	
Black or African American			0.760	
Other Race	0.606	0.581	0.415	
Asian/Pacific Islander	0.398	0.344	0.564	
Hispanic	0.538	0.667	0.491	0.553

(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

TABLE 4

Other Allegations APS Model Summary

Selected Adjusted Odds[1]

	ELDERS (60+)		ADULTS (<60)	
	OTHER ALLEGATION	SUBSTANTIATED OTHER ALLEGATION	OTHER ALLEGATION	SUBSTANTIATED OTHER ALLEGATION
Prior APS Involvement				
Any Allegation in Base Year	6.372	5.889	7.107	5.135
Physical Health Conditions				
Parkinson's	1.392			
Cerebral Palsy	1.454			
Epilepsy		1.266	1.403	
Multiple Sclerosis	1.568	1.676		
Muscular Dystrophy			1.354	2.751
Spina Bifida	0.778			
Diabetes		1.263	1.212	
Peripheral Vascular Disease			1.349	
ESRD Enrollment	1.381		0.743	
Neurogenic bladder Rx			1.436	
Chronic Kidney Disease		1.252		
Gastric Acid Disorder Rx			1.244	1.280
Infections, high Rx		0.681	0.768	
Thyroid Disorder Rx				1.399
Pulmonary, medium		1.307		
Skin, high			1.302	
Skin, low	1.212			
Cancer, high		0.672		
Cancer, low	0.792			
Pain Rx		0.825	0.765	
Fibromyalgia, Chronic Pain			0.814	
Migraine			0.791	
Mental Health Conditions				
Anxiety Disorders (Ever Diagnosed)				1.348
Depression (Ever Diagnosed)	1.421	1.420		
Schizophrenia/Psychotic Disorders	1.204		1.236	
PTSD	1.307	1.349		
Substance Use Disorders				
Alcohol Use Disorders	1.429	1.703		0.339
Opioid Use Disorder	1.255			
Other Drug Disorders	1.201	1.311		
Cognitive Conditions				
Alzheimer's	1.709	1.924	1.367	
Traumatic Brain Injury	1.221		1.384	2.159
Intellectual and Developmental				
Autism Spectrum Disorders	1.598		1.812	2.743
Intellectual Disabilities	2.450		3.118	2.980
Other Developmental Delays	2.040	4.978	1.757	2.000
Functional Limitations				
Hospital beds			1.260	
Wheelchairs			1.425	
Wheelchair dependence Dx		1.267		
Mobility Impairments	1.413	1.548	1.475	1.795

	ELDERS (60+)		ADULTS (<60)	
	OTHER ALLEGATION	SUBSTANTIATED OTHER ALLEGATION	OTHER ALLEGATION	SUBSTANTIATED OTHER ALLEGATION
Falls	1.231	1.592	1.325	1.474
Other reduced mobility			1.212	
Blindness and Visual Impairment			1.348	
Deafness and Hearing Impairment			1.244	
Frailty Indicators				
Abnormal gait		1.211	1.222	
Altered mental status	1.324		1.200	
Coordination			1.222	
Muscle weakness		1.478		
Incontinence			1.207	
Weight Loss	1.121		1.246	
Health Service Utilization				
One ED Visit (Relative to None)	1.330	1.450		
Two or more ED Visits (Relative to None)	1.479	1.569		
Any Acute Inpatient Stays	0.780			
Any SNF Stays			1.262	
Any Other Inpatient Stays (psych, rehab)			0.801	
Any ED-related Inpatient Admission	1.318			
Skilled RN Home Visits			1.225	1.714
Socio-Economic Factors				
Part D Subsidy Receipt	2.567	2.227	3.800	6.796
% Households with Income >= $100,000	0.302	0.221	0.631	
Homeless(2)	1.208			
Living Alone(2)		1.459	1.419	
Demographics				
Age 75-84 (Relative to Age 60-74)	1.690	1.377		
Age 85+ (Relative to Age 60-74)	2.329	1.893		
Black or African American	1.258	1.882	0.801	
Asian/Pacific Islander	0.488	0.373	0.748	
Hispanic	0.738	0.699	0.668	
American Indian/Alaska Native	1.584	1.810		

(1) Only characteristics associated with an effect of at least 20 percent on the odds of the event are displayed.
(2) Based on Z-code diagnoses in health service data.

Chronic Illness and Disability Payment System (CDPS) and Medicaid-Rx risk classification systems. The CDPS is a diagnostic classification system developed by researchers at the University of California at San Diego, designed to support risk-based capitated payment systems for Medicaid beneficiaries. The CDPS categorizes ICD-9 and ICD-10 diagnosis codes into approximately 20 major physical and behavioral health condition categories. Examples of major diagnostic categories include cardiovascular disease, diabetes, psychiatric disorders, and substance use disorders. Within major diagnostic categories, conditions are further organized into levels of severity. For example, schizophrenia is grouped into the "Psychiatric High" risk group, while bipolar affective disorder is grouped into the "Psychiatric Medium" risk group.

The Medicaid-Rx is a pharmacy classification system, also developed by researchers at the University of California at San Diego to support risk-based capitated payment systems for Medicaid beneficiaries. The Medicaid-Rx categorizes medications into 45 pharmacy risk groups based on primary on-label usage. Examples of pharmacy risk groups include medications to treat cardiovascular disorders (e.g., ace inhibitors, beta blockers, nitrates, digitalis, vasodilators) and medications to treat schizophrenia or bipolar disorders (e.g., antipsychotic medications and lithium). More information about the CDPS and Medicaid-Rx is available from the University of California at San Diego at https://hwsph.ucsd.edu/research/programs-groups/cdps.html.

Medicare Master Beneficiary Summary Files (MSBF). Medicare MSBF files were obtained from the Research Data Assistance Center (ResDAC) at the University of Minnesota. ResDAC is a Centers for Medicare and Medicaid Services (CMS) contractor providing assistance to academic, non-profit, for-profit, and government researchers in accessing and using CMS data. The MSBF file set includes information about Medicare program enrollment, chronic conditions, cost, and utilization. Chronic conditions are identified using the CMS Chronic Conditions Data Warehouse (CCW) diagnostic classification system and a supplementary condition set identifying other chronic or potentially disabling conditions. The original CCW condition set includes physical health conditions that tend to be more prevalent among elders (e.g., acute myocardial infarction, Alzheimer's disease, and diabetes). The supplemental condition set includes other disabling conditions, notably psychiatric, substance use, and intellectual and developmental disorders. More information about the CCW is available at https://www2.ccwdata.org/web/guest/condition-categories-chronic. More information about the MSBF supplemental conditions is available at https://resdac.org/cms-data/files/mbsf-other-conditions.

Interpretation of the concordance statistic. The concordance statistic (C-statistic) is a widely used measure of predictive accuracy for logistic regression models. "Concordance" means that a person who experiences the outcome (e.g., APS involvement) has a higher predicted probability of that outcome than a person who does not experience the outcome. The C-statistic is the proportion of pairs of individuals for which the person who experiences the outcome has a higher predicted probability than the person who does not experience the outcome, among all possible pairs in which one person experiences the outcome of interest and the other one does not. The higher the C-statistic, the better the model can discriminate between subjects who experience the outcome of interest and subjects who do not. It is important to note that the C-statistic is not a measure of the predictive accuracy of the model for a given individual. Specifically, the C-statistic is not a measure of the proportion of persons who experienced the outcome who were predicted to be more likely to experience the outcome than to not experience the outcome.

REFERENCES

Acierno, R., Hernandez, M., Amstadter, A., Resnick, H., Steve, K., Muzzy., and Kilpatrick, D. (2010). Prevalence and Correlates of Emotional, Physical, Sexual, and Financial Abuse and Potential Neglect in the United States: The National Elder Mistreatment Study. *American Journal of Public Health* 100:292-297.

Anthony, E., Lehning, A., Austin, M., and Peck, M. (2009). Assessing Elder Mistreatment: Instrument Development and Implications for Adult Protective Services. *Journal of Gerontological Social Work*. 52(8): 815-836.

Dyer, C., Goodwin, J., Pickens-Pace, S., Burnett, J., and Kelly, P. (2007). Self-Neglect Among the Elderly: A Model Based on More Than 500 Patients Seen by a Geriatric Medicine Team. *American Journal of Public Health* 97:1671-1676.

Ernst, J., Ramsey-Klawsnik, H., Schillerstrom, J., Dayton, C., Mixson, P., and Counihan, M. (2014). Informing Evidence-Based Practice: A Review of Research Analyzing Adult Protective Services Data. *Journal of Elder Abuse and Neglect* 26(5):458-494.

Gorbien, M. and Eisenstein, A. (2005). Elder Abuse and Neglect: An Overview. *Clinics in Geriatric Medicine*. 21:279-292.

Lachs, M., Williams, C., O'Brien, S., Hurst, L., and Horwitz, R. (1996) Older Adults: An 11-Year Longitudinal Study of Adult Protective Service Use. *Archives of Internal Medicine* 156(4):449-453.

Lachs, M., Williams, C., O'Brien, S., Hurst, L., and Horwitz, R. (1997) Risk Factors for Reported Elder Abuse and Neglect: A Nine-Year Observational Cohort Study. *The Gerontologist* 37(8): 469-474.

Sommerfeld, D., Henderson, L., Snider, M., and Aarons, G. (2014). Multidimensional Measurement Within Adult Protective Services: Design and Initial Testing of the Tool for Risk, Interventions, and Outcomes. *Journal of Elder Abuse and Neglect* 26(5):495-522.

Storey, J. E. (2020). Risk factors for elder abuse and neglect: A review of the literature. *Aggression and Violent Behavior*. 50:101339.

REPORT CONTACT: David Mancuso, PhD, 360.902.7557
VISIT US AT: https://www.dshs.wa.gov/rda

ACKNOWLEDGEMENT

We want to acknowledge the work of our colleagues throughout the research and data analysis division and our partner programs for all the work they do in serving Washington's vulnerable populations.