



Investigating Caregiving Dynamics and Subjective Cognitive Decline: An Analysis Using BRFSS Database Insights

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This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Subjective cognitive decline (SCD), characterized by self-reported memory or cognitive difficulties, is an increasing concern among older adults. This study utilizes data from the Behavioral Risk Factor Surveillance System (BRFSS) to examine SCD prevalence, professional consultation patterns, and caregiving dynamics among U.S. adults aged 45 years and older.

Objectives: To explore trends in the prevalence of SCD, the extent of professional consultation among those experiencing SCD, and recent caregiving activities. The study aims to identify demographic variations and assess changes over time.

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Methods: This cross-sectional study analyzes BRFSS data from 2020 and 2022, which includes self-reported data on cognitive symptoms, professional consultation, and caregiving activities. Descriptive statistics and age-adjusted prevalence estimates were computed for SCD, professional consultation, and caregiving activities. Comparative analyses were performed to identify trends between 2020 and 2022, and to assess variations across demographic groups.

Results: Between 2020 and 2022, the age-adjusted prevalence of SCD among adults aged 45 and older rose from 9.7% to 11.7%, affecting both genders. Prevalence increased from 9.4% to 11.8% for males and from 10.0% to 11.7% for females. In 2022, Black non-Hispanic adults had a prevalence of 12.2%, Hispanic adults 12.3%, Asian non-Hispanic adults 9.4%, Hawaiian or Pacific Islander non-Hispanic adults 9.9%, American Indian or Alaska Native non-Hispanic adults 21.1%, and Multiracial non-Hispanic adults 19.2%. Professional consultation rates declined from 47.7% to 44.3%. Caregiving for individuals with dementia or cognitive impairment was reported by 22.4% in 2020, decreasing slightly to 21.3% in 2022. General caregiving showed a slight increase from 18.9% to 19.5%. Variations in SCD prevalence and caregiving activities were observed across gender, race, and ethnicity.

Conclusion: The study highlights a rising trend in SCD and variations in professional consultation and caregiving dynamics. These findings emphasize the need for targeted public health strategies to address cognitive decline and support caregivers. Enhancing access to healthcare and caregiver resources is crucial for improving outcomes for affected individuals and their caregivers.

Keywords: *Subjective cognitive decline; professional consultation; caregiving; behavioral risk factor surveillance system; cognitive health; older adults.*

1. INTRODUCTION

Subjective cognitive decline (SCD) represents a critical area of concern within the realm of cognitive health, particularly in the United States, where an aging population is increasingly susceptible to memory and cognitive challenges [1]. SCD is characterized by individuals' self-reported experiences of cognitive difficulties, such as memory loss or confusion, which may signal the early stages of more serious cognitive conditions, including dementia. Understanding SCD is vital as it can provide early indicators for preventive care and intervention, thereby enhancing the overall management of cognitive health among older adults [2].

Epidemiological data reveal that approximately 11% of older adults in the U.S. report experiencing SCD, with rates expected to rise as the population of adults aged 65 and older continues to grow [3]. According to the Alzheimer's Association, more than 6 million Americans are living with Alzheimer's disease, a condition closely linked to SCD. As the U.S. population ages, the number of individuals with cognitive impairments is anticipated to increase significantly, underscoring the urgency of addressing cognitive health in public health strategies [4].

The pathological mechanisms underlying SCD are multifaceted and complex. SCD can result from a range of neurodegenerative processes,

including the accumulation of amyloid plaques and tau tangles, which are characteristic of Alzheimer's disease. Additionally, vascular changes, such as small vessel disease and reduced cerebral blood flow, can contribute to cognitive decline [5]. These neurobiological changes may not always be detectable through standard clinical assessments, making self-reported symptoms a crucial aspect of early detection. The onset of SCD often precedes more pronounced cognitive impairments, providing an opportunity for early intervention and management [5-6].

Caregiving dynamics are intricately linked to SCD, as individuals experiencing cognitive decline often require increased support and assistance. In 2021, nearly 11 million Americans family members provided unpaid care for individuals with dementia, reflecting the significant impact of cognitive decline on both individuals and their caregivers in the United States [7]. Caregiving for those with dementia or other cognitive impairments presents unique challenges, including managing daily activities, addressing behavioral symptoms, and navigating complex healthcare needs. The emotional, physical, and financial burdens on caregivers can be substantial, highlighting the need for supportive interventions and resources [8].

This study leverages BRFSS data from 2020 and 2022 to investigate three key aspects: the

prevalence of subjective cognitive decline among adults aged 45 years and older, the extent to which individuals with SCD seek professional consultation, and the patterns of caregiving activities [9]. By analyzing these elements, the study aims to provide a comprehensive overview of how self-reported cognitive symptoms correlate with professional help-seeking behaviors and caregiving responsibilities. The insights gained from BRFSS data can inform future research, policy development, and public health interventions aimed at improving cognitive health and support systems for older adults.

2. METHODS

2.1 Study Design and Data Source

This study leverages data from the Behavioral Risk Factor Surveillance System (BRFSS) to investigate subjective cognitive decline (SCD), professional consultation, and recent caregiving activities among adults aged 45 years and older. Established in 1984, the BRFSS is the world's largest ongoing health survey, encompassing all U.S. states, the District of Columbia, and three territories. With over 400,000 interviews conducted annually, it provides extensive insights into health-related behaviors, chronic conditions, and preventive service usage. The survey employs a comprehensive approach, including random digit dialing and both landline and mobile phone numbers to ensure nationwide representation and inclusivity [9].

2.2 Sample and Data Collection

The analysis focuses on BRFSS data from 2020 and 2022 to examine temporal trends. Participants were selected through random digit dialing and were interviewed using standardized questionnaires administered by trained professionals. To maintain data integrity, the BRFSS incorporates rigorous quality control measures, including regular audits, interviewer training, and validation studies. The study targets adults aged 45 years and older, capturing a diverse demographic range to reflect national health trends accurately.

2.3 Variables and Measures

1. **SCD:** It is assessed through self-reported data on cognitive symptoms, specifically asking respondents if they have experienced confusion or memory loss in the past month. The prevalence is

determined by the proportion of affirmative responses.

2. **Professional consultation:** For individuals reporting SCD, further inquiries are made regarding whether they have discussed these symptoms with a healthcare professional. This measure is recorded as the percentage of individuals with SCD who have sought professional advice.
3. **Caregiving activities:** Caregiving data are categorized into two primary types:
 - **Care for dementia or cognitive impairment:** This includes self-reported caregiving for individuals with dementia or other cognitive impairments within the past month.
 - **General caregiving:** This refers to care provided to a friend or family member, regardless of their cognitive status, in the past month.

Both types of caregiving are reported as age-adjusted percentages to account for demographic variations.

2.4 Data Analysis

Descriptive statistics summarize the prevalence rates for SCD, professional consultation, and caregiving activities. Age-adjusted prevalence estimates ensure comparability across different age groups. Confidence intervals (95% CI) are calculated to gauge the precision of these estimates and assess statistical significance. Comparative analyses between 2020 and 2022 identify trends over time, including significant increases or decreases. The analysis also explores variations by gender, race, and ethnicity to provide a detailed understanding of demographic disparities.

3. RESULTS

3.1 SCD among Adults Aged 45 Years and Older

Table 1 presented the SCD among adults during study period. Between 2020 and 2022, the age-adjusted prevalence of SCD among adults aged 45 years and older increased significantly from 9.7% (95% CI: 9.3–10.0) to 11.7% (95% CI: 11.3–12.2). This increase was observed across both genders. For males, the prevalence rose from 9.4% (95% CI: 8.9–9.9) in 2020 to 11.8% (95% CI: 11.1–12.5) in 2022. For females, the prevalence increased from 10.0% (95% CI: 9.5–10.5) to 11.7% (95% CI: 11.1–12.4).

Among specific racial and ethnic groups, data for 2020 is limited. However, in 2022, Black non-Hispanic adults had a prevalence of 12.2% (95% CI: 11.0–13.5), and Hispanic adults had a prevalence of 12.3% (95% CI: 10.7–14.1). Asian non-Hispanic adults reported a prevalence of 9.4% (95% CI: 6.7–13.1). Hawaiian or Pacific Islander non-Hispanic adults had a prevalence of 9.9% (95% CI: 5.1–18.3), while American Indian or Alaska Native non-Hispanic adults showed a notably high prevalence of 21.1% (95% CI: 15.1–28.6). Multiracial non-Hispanic adults had a prevalence of 19.2% (95% CI: 14.4–25.1). Overall, the increase in prevalence from 2020 to 2022 underscores a growing concern in cognitive health, with significant disparities across demographic groups.

3.2 Symptoms of SCD with a Health Care Professional

Table 1 presented the SCD with health care professionals. The age-adjusted prevalence of discussing symptoms of SCD with a health care professional among adults aged 45 years and older showed a decrease from 47.7% (95% CI: 45.8–49.6) in 2020 to 44.3% (95% CI: 42.2–46.5) in 2022. This overall decline was seen across both genders. Specifically, the percentage of males who discussed their symptoms with a health care professional decreased from 43.5% (95% CI: 40.7–46.4) in 2020 to 39.4% (95% CI: 36.3–42.6) in 2022. For females, the prevalence decreased from 51.1% (95% CI: 48.5–53.6) to 48.6% (95% CI: 45.8–51.5).

Among racial and ethnic groups, White non-Hispanic adults saw a decrease from 49.0% (95% CI: 47.1–51.1) in 2020 to 46.9% (95% CI: 44.8–49.1) in 2022. Black non-Hispanic adults had a prevalence of 46.2% (95% CI: 40.9–51.5) in 2022. Hispanic adults reported a lower prevalence of 39.3% (95% CI: 32.7–46.4), while Asian non-Hispanic adults had a notably lower prevalence of 15.6% (95% CI: 8.4–27.2). Hawaiian or Pacific Islander non-Hispanic adults also saw a decrease from 37.3% (95% CI: 24.1–52.7) to 33.5% (95% CI: 19.6–50.8). American Indian or Alaska Native non-Hispanic adults had a prevalence of 49.2% (95% CI: 37.1–61.5), and Multiracial non-Hispanic adults reported the highest prevalence at 62% (95% CI: 48.2–74.1) (Table 1). These trends indicate a general decline in discussions with health care professionals about SCD, with variations across different demographic groups.

3.3 Provided Care for Someone with Dementia or other Cognitive Impairment in the Past Month among Adults

Table 2 present the care provided for dementia or cognitive impairment. The age-adjusted prevalence of providing care for someone with dementia or other cognitive impairments among adults declined slightly from 22.4% (95% CI: 21.1–23.7) in 2020 to 21.3% (95% CI: 20.4–22.3) in 2022. This overall decrease is reflected across both genders, with males showing a slight reduction from 20.6% (95% CI: 18.6–22.9) to 20.0% (95% CI: 18.6–21.5). For females, the prevalence decreased from 23.8% (95% CI: 22.1–25.5) to 22.2% (95% CI: 21.0–23.4).

Among racial and ethnic groups, White non-Hispanic adults experienced a decrease from 22.4% (95% CI: 21.0–23.9) in 2020 to 21.5% (95% CI: 20.4–22.6) in 2022. Black non-Hispanic adults saw a decrease from 22.9% (95% CI: 18.9–27.5) to 21.1% (95% CI: 18.8–23.6). Hispanic adults also experienced a decline from 22.1% (95% CI: 17.7–27.2) to 20.3% (95% CI: 17.6–23.3).

Asian non-Hispanic adults had an increase from 18.9% (95% CI: 12.7–27.3) in 2020 to 24.6% (95% CI: 17.5–33.5) in 2022. Hawaiian or Pacific Islander non-Hispanic adults saw a notable decrease from 36.4% (95% CI: 26.2–48.0) to 23.5% (95% CI: 15.3–34.3). American Indian or Alaska Native non-Hispanic adults had an increase from 21.7% (95% CI: 12.6–34.9) to 24.0% (95% CI: 19.1–29.8), while Multiracial non-Hispanic adults saw a decline from 25.1% (95% CI: 19.1–32.2) to 19.9% (95% CI: 16.4–23.8). These trends highlight variations in caregiving prevalence across different demographic groups and a general slight decrease over the two-year period.

3.4 Provided Care for a Friend or Family Member in the Past Month among Adults

Table 2 present general caregiving among adults in the past month. The age-adjusted prevalence of providing care for a friend or family member in the past month among adults showed a slight increase from 18.9% (95% CI: 18.4–19.5) in 2020 to 19.5% (95% CI: 19.2–19.9) in 2022. This increase was observed across both genders.

Table 1. SCD and consultation with health care professionals

Indicators	SCD among adults aged 45 years and older				Discussed symptoms of SCD with a health care professional among adults aged 45 years and older with SCD			
	Year	2020		2022		2020		2022
Age-adjusted Prevalence (%)	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Overall	9.7	9.3 - 10.00	11.7	11.3 - 12.2	47.7	45.8 - 49.6	44.3	42.2 - 46.5
Male	9.4	8.9 - 9.9	11.8	11.1 - 12.5	43.5	40.7 - 46.4	39.4	36.3 - 42.6
Female	10	9.5 - 10.5	11.7	11.1 - 12.4	51.1	48.5 - 53.6	48.6	45.8 - 51.5
White, non-Hispanic	9.4	9.00 - 9.7	11.1	10.7 - 11.5	49	47.1 - 51.1	46.9	44.8 - 49.1
Black, non-Hispanic	-	-	12.2	11.00 - 13.5	-	-	46.2	40.9 - 51.5
Hispanic	-	-	12.3	10.7 - 14.1	-	-	39.3	32.7 - 46.4
Asian, non-Hispanic	-	-	9.4	6.7 - 13.1	-	-	15.6	8.4 - 27.2
Hawaiian or Pacific Islander, non-Hispanic	11.2	6.1 - 19.5	9.9	5.1 - 18.3	37.3	24.1 - 52.7	33.5	19.6 - 50.8
American Indian or Alaska Native, non-Hispanic	-	-	21.1	15.1 - 28.6	-	-	49.2	37.1 - 61.5
Multiracial, non-Hispanic	-	-	19.2	14.4 - 25.1	-	-	62	48.2 - 74.1

Table 2. Care provided for dementia or cognitive impairment and general caregiving among adults in the past month

Indicators	Provided care for someone with dementia or other cognitive impairment in the past month among adults				Provided care for a friend or family member in the past month among adults				
	Year	2020		2022		2020		2022	
Age-adjusted Prevalence (%)	%	95% CI		%	95% CI		%	95% CI	
Overall	22.4	21.1 - 23.7		21.3	20.4 - 22.3		18.9	18.4 - 19.5	
Male	20.6	18.6 - 22.9		20	18.6 - 21.5		16.6	15.9 - 17.4	
Female	23.8	22.1 - 25.5		22.2	21.00 - 23.4		21.1	20.3 - 21.8	
White, non-Hispanic	22.4	21.00 - 23.9		21.5	20.4 - 22.6		20.2	19.5 - 20.9	
Black, non-Hispanic	22.9	18.9 - 27.5		21.1	18.8 - 23.6		20.5	18.7 - 22.4	
Hispanic	22.1	17.7 - 27.2		20.3	17.6 - 23.3		15.2	13.7 - 16.9	
Asian, non-Hispanic	18.9	12.7 - 27.3		24.6	17.5 - 33.5		10.1	8.1 - 12.6	
Hawaiian or Pacific Islander, non-Hispanic	36.4	26.2 - 48.00		23.5	15.3 - 34.3		23.1	17.6 - 29.6	
American Indian or Alaska Native, non-Hispanic	21.7	12.6 - 34.9		24	19.1 - 29.8		22.7	17.4 - 29.1	
Multiracial, non-Hispanic	25.1	19.1 - 32.2		19.9	16.4 - 23.8		24.7	21.6 - 28.00	

For males, the prevalence remained relatively stable, at 16.6% (95% CI: 15.9–17.4) in 2020 and slightly decreasing to 16.5% (95% CI: 16.0–17.0) in 2022. In contrast, females showed an increase from 21.1% (95% CI: 20.3–21.8) to 22.4% (95% CI: 21.8–23.0).

Among racial and ethnic groups, White non-Hispanic adults saw a modest increase from 20.2% (95% CI: 19.5–20.9) in 2020 to 20.6% (95% CI: 20.1–21.1) in 2022. Black non-Hispanic adults experienced a rise from 20.5% (95% CI: 18.7–22.4) to 21.7% (95% CI: 20.6–22.8). Hispanic adults, however, saw a decrease from 15.2% (95% CI: 13.7–16.9) to 14.7% (95% CI: 13.8–15.7). Asian non-Hispanic adults reported an increase from 10.1% (95% CI: 8.1–12.6) to 13.2% (95% CI: 11.0–15.6). Hawaiian or Pacific Islander non-Hispanic adults saw a decrease from 23.1% (95% CI: 17.6–29.6) to 20.9% (95% CI: 16.5–26.1). American Indian or Alaska Native non-Hispanic adults had a slight increase from 22.7% (95% CI: 17.4–29.1) to 23.2% (95% CI: 20.7–25.8). Multiracial non-Hispanic adults showed a minor increase from 24.7% (95% CI: 21.6–28.0) to 24.9% (95% CI: 22.7–27.1) (Table 2). Overall, the data indicates a slight overall increase in caregiving prevalence, with notable variations among different demographic groups.

4. DISCUSSION

This study provides valuable insights into SCD and sheds light on the prevalence of SCD, the engagement with healthcare professionals, and the patterns of caregiving. These findings offer important implications for public health strategies and support systems designed to address cognitive health and caregiving needs.

The study reveals a notable increase in the prevalence of SCD among U.S. adults aged 45 years and older, rising from 9.7% in 2020 to 11.7% in 2022. This upward trend is consistent with broader epidemiological patterns, which indicate that subjective cognitive complaints are becoming more prevalent as the population ages. The CDC's analysis of the 2015 and 2016 BRFSS surveys by Taylor also reported similar findings and found 11.2% of adults aged ≥45 years reported SCD, with 50.6% experiencing functional limitations. Individuals with SCD, especially those living alone or with chronic diseases, should consult healthcare professionals for assessment and management [10]. The increase in reported cases of SCD may reflect both a genuine rise in cognitive issues and

a growing awareness and willingness among individuals to report cognitive symptoms [11].

Gender and racial disparities are evident in the prevalence of SCD. The data show that females consistently report higher rates of SCD compared to males. This gender disparity aligns with existing literature suggesting that women are more likely to experience and report cognitive decline, potentially due to biological differences, such as hormonal influences, and differences in health-seeking behaviors [12-13]. However, some studies have reported conflicting results, showing that males also report higher rates of SCD compared to females [14-15]. Additionally, the absence of data for some racial and ethnic groups in 2020 limits comprehensive cross-group comparisons, but available data for 2022 indicate higher prevalence rates among Black, Hispanic, and Multiracial populations compared to their White counterparts. These findings are consistent with a prior survey conducted by Gupta et al., which found that 12.3% of Black individuals reported experiencing SCD, the highest percentage among the racial groups studied. In comparison, 10.7% of White individuals and 9.9% of Hispanic individuals reported SCD. This indicates a notable disparity in the prevalence of SCD across different racial groups, with Black individuals exhibiting the highest rates of self-reported cognitive issues [10,12]. These variations underscore the need for targeted interventions and culturally sensitive approaches to addressing cognitive decline.

The study highlights that a significant proportion of individuals experiencing SCD do not seek professional consultation. In 2020, 47.7% of those with SCD reported discussing their symptoms with a healthcare professional, which decreased to 44.3% in 2022. This decline in professional consultation rates may suggest barriers to accessing healthcare or a lack of awareness about the importance of seeking medical advice for cognitive symptoms [16]. Further, the decline in professional consultation rates witnessed can be attributed to factors such as the observation that a larger proportion of dementia patients do not meet dementia specialists, and are mostly diagnosed and subsequently cared for by various non-specialists [17,18]. In using Medicare data in tracking dementia diagnoses in almost 250,000 individuals in a period of five years, a study conducted in the United States disclosed that 85% of dementia patients had their initial diagnosis performed by non-dementia specialist

physician, habitually a primary care physician [19,20]. The decline in professional consultation rates can additionally be attributed to misdiagnosis of dementia in some patients. For instance, a recent study has disclosed that over 50% of elderly patients attending memory clinics presented functional cognitive disorders as opposed to dementia [21,22]. Consequently, the decline in the rates of professional consultations can be attributed to the challenges in diagnosing the rare dementia forms, including frontotemporal dementia, primary progressive aphasia, and non-amnesic presentations of Alzheimer's disease, which might be delayed owing to the fewer number of dementia specialists capable of recognizing and diagnosing this conditions [20,23]. This often results in most patients failing to seek professional consultations on the condition. Nevertheless, the overall decline in consultation rates indicates a need for increased efforts to encourage individuals experiencing cognitive decline to engage with healthcare services. Strategies could include public health campaigns aimed at raising awareness about the importance of early intervention and improving access to healthcare services for older adults [24].

Caregiving for individuals with dementia or cognitive impairment presents significant challenges and is a critical aspect of the broader caregiving landscape. The study found that 22.4% of adults provided care for someone with dementia or cognitive impairment in 2020, with a slight decrease to 21.3% in 2022. This decrease may reflect changes in caregiving patterns or varying levels of caregiving responsibilities among the population [25]. Recent studies focusing on caregiving for elderly persons with dementia has supported these observations by demonstrating that the elderly persons' disease status, the caregiver's health status, age, and level of education are important predictors of the caregiver burden [26].

The burden of caregiving is considerable and multifaceted, impacting caregivers' emotional, physical, and financial well-being. Caregivers often face high levels of stress and emotional strain, particularly when caring for individuals with severe cognitive impairments [26,27]. Further, a number of studies have also disclosed that neuropsychiatric symptoms, including agitation, anxiety, disinhibition, and violent behaviors, are closely linked to caregiver burden compared to other symptoms like limitation in daily-living activities and lower cognitive

functions [28-30]. The study's findings highlight the need for supportive services and resources for caregivers, including respite care, counseling, and financial assistance. Addressing these needs is crucial to reducing caregiver burnout and improving the overall quality of care provided to individuals with cognitive impairments.

5. CONCLUSION

This study provides a detailed analysis of subjective cognitive decline, professional consultation, and caregiving dynamics using BRFSS data. The findings highlight important trends and disparities, offering valuable insights for public health initiatives and policy development. Addressing the challenges associated with cognitive decline and caregiving requires a multifaceted approach that includes raising awareness, improving healthcare access, and supporting caregivers. By focusing on these areas, we can enhance the quality of life for older adults and their caregivers, ultimately contributing to a more effective and equitable healthcare system.

6. STRENGTH AND LIMITATION

This study leverages the extensive BRFSS dataset, providing a robust, nationwide perspective on SCD and caregiving dynamics among adults aged 45 and older. The large sample size and rigorous data collection methods ensure high reliability and generalizability of findings, with recent data offering timely insights into trends and changes in SCD and caregiving practices. However, the study relies on self-reported data, which may be subject to reporting biases and inaccuracies. The cross-sectional design limits causal inferences about the relationships between SCD, professional consultation, and caregiving activities. Additionally, the BRFSS does not capture detailed clinical information, which could affect the interpretation of cognitive decline severity and caregiving needs.

7. IMPLICATIONS FOR PUBLIC HEALTH AND POLICY AND FUTURE RESEARCH DIRECTIONS

The findings from this study underscore the importance of addressing subjective cognitive decline and caregiving dynamics within public health and policy frameworks. Public health initiatives should focus on raising awareness about cognitive decline, promoting early

detection, and encouraging individuals to seek professional consultation. Efforts to improve access to healthcare services, particularly for underserved populations, are essential for ensuring that individuals experiencing cognitive symptoms receive timely and appropriate care.

Additionally, policy makers should consider the needs of caregivers when designing support programs. Providing financial assistance, respite care, and mental health resources can help alleviate the burden on caregivers and improve their quality of life. Expanding access to these resources can also enhance the care provided to individuals with cognitive impairments, leading to better health outcomes for both caregivers and care recipients.

Future research should focus on longitudinal studies to track changes in subjective cognitive decline and caregiving dynamics over time. Understanding how these trends evolve can inform the development of targeted interventions and support programs. Additionally, research exploring the effectiveness of different strategies for increasing professional consultation rates and supporting caregivers will be valuable in shaping evidence-based public health policies.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

ETHICAL APPROVAL AND CONSENT

The BRFSS data, publicly available and de-identified, uphold participant confidentiality and ethical standards. The study followed ethical guidelines for secondary data analysis, ensuring no individual could be identified. Conducted by the CDC, the BRFSS adheres to federal regulations for protecting human subjects, including IRB approvals and informed consent. No extra IRB approval was needed for this analysis.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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