









ORIGINAL RESEARCH

Patient Portals and Shared Decision-Making in US Adults With or at Risk of Cardiovascular Diseases: A Cross-Sectional Study

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BACKGROUND: Patient portals are secure online platforms that have shown potential to facilitate shared decision-making (SDM) in cardiovascular disease risk reduction. However, the role of health care providers (HCPs) in offering patient portals within the context of SDM remains poorly understood. This study aimed to examine the relationship between patient portal access offered by HCPs and patient engagement in SDM among adults with or at risk of cardiovascular disease in the United States (US).

METHODS: This population-based cross-sectional study included a nationally representative sample of US adults from the 2022 Health Information National Trends Survey. We performed weighted multivariable logistic regression analyses to examine the association between patient portal access offered by HCPs and patient engagement in SDM.

RESULTS: The study included a representative sample of 4234 adults with or at risk of cardiovascular disease. The mean age of the participants was 48.5 years (SD, 17.1), with 50.6% female and 62.8% White. Adults who were offered access to patient portals by HCPs (adjusted odds ratio, 2.11 [95% CI, 1.34–3.32]) and encouraged to use them (adjusted odds ratio, 1.68 [95% CI, 1.15–2.45]) were more likely to engage in SDM than their counterparts, adjusting for covariates. The extent of this association varied by demographics and social determinants of health.

CONCLUSIONS: Offering access to patient portals and encouragement to use them by HCPs was associated with high SDM among US adults with or at risk of cardiovascular disease. Future research is needed to explore the possible causal relationship between patient portal use and access and patient engagement in SDM.

Key Words: cardiovascular disease ■ patient portal ■ shared decision-making ■ social determinants of health

Shared decision-making (SDM) is a widely endorsed approach aimed at enhancing patient-centered care and promoting cardiovascular disease (CVD) risk reduction.^{1,2} The process of SDM involves collaborative communication between patients and health care providers (HCPs), ensuring that medical decisions align

with patients' preferences and values.² This patient-centered approach is critical in managing chronic conditions like CVD and its risk factors such as hypertension, diabetes, and unhealthy behaviors, where patient engagement and adherence to treatment plans significantly improve health outcomes.³

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RESEARCH PERSPECTIVE

What Is New?

- In this cross-sectional study based on a representative sample of 4234 US adults with or at risk of cardiovascular disease in 2022, adults who were offered access to patient portals by health care providers were more than twice as likely to engage in shared decision-making (SDM) compared with those who were not.
- Adults who were encouraged to use patient portals by health care providers were 68% more likely to engage in SDM compared with those who were not.
- The extent of the association between offered patient portal access by health care providers and SDM varied by demographics and social determinants of health.

What Question Should Be Addressed Next?

- Future research is needed to further explore the potential causal relationship between offering access to patient portals and encouragement to use them by health care providers, patient portal use, and patient engagement in SDM.
- Future interventional or observational studies are needed to examine the role of bidirectional communication through online patient portals in relation to SDM among adults with chronic diseases.

Nonstandard Abbreviations and Acronyms

HCPs	health care providers
HINTS	Health Information National Trends Survey
SDM	shared decision-making
SDOH	social determinants of health

Patient portals are secure online platforms that provide patients with access to their health information and communication tools, which has shown the potential to facilitate SDM.⁴ The patient portals enable patients to access their medical records, communicate with HCPs, schedule appointments, and manage their health more actively, and therefore may enhance patient involvement in care.^{4,5} Despite these benefits, disparities in patient portal access and use persist.^{5–7} Demographic characteristics and social determinants of health (SDOH), such as race and ethnicity, education, and health literacy, may influence both the likelihood of access to patient portals

and the degree of patient engagement in SDM.^{5,6,8,9} Additionally, research indicates that patients who are offered access to patient portals by their HCPs may be more likely to use them and engage in their health care.¹⁰ However, the extent to which HCP's role (such as offering access to and encouraging the use of patient portals) and the frequency of patient portal use contribute to patient engagement in SDM among adults with or at risk of CVD has not been thoroughly examined.⁵

Thus, we conducted a cross-sectional study to explore the relationship between offering access to patient portals and encouraging their use by HCPs, and the frequency of patient portal use, and patient engagement in SDM among adults with or at risk of CVD in the United States. The study also examined how these relationships vary across different demographic factors and SDOH.

METHODS

The authors declare that all supporting data are available within the article and its online supplementary files. This study follows the Strengthening the Reporting of Observational Studies in Epidemiology reporting guideline.¹¹ The Health Information National Trends Survey (HINTS) study has received approval from the Westat Institutional Review Board. Due to the deidentification of the data, HINTS has been designated as exempt by the US National Institutes of Health Office of Human Subjects Research Protections. As determined by the Johns Hopkins University School of Medicine institutional review board, this analysis did not require institutional review board review.

Data Source

The HINTS is a cross-sectional, nationally representative survey of the US noninstitutionalized adult population (≥18 years), collecting data on health-related information and health-related knowledge, attitudes, behavior, and the use of cancer-related information; various aspects of digital health, including patient portal access and use; and patient-provider communication. Since 2003, HINTS has been routinely administered by the National Cancer Institute, with the general population survey conducted 6 times (HINTS 1–6). The full description of the HINTS methodologies can be found elsewhere.¹² In the present study, we utilized the most recent HINTS data (referred to as HINTS 6) because social issues (SDOH and health care discrimination experiences) were the special interest of this administration.¹³ HINTS 6 data were collected from March through November 2022. HINTS 6 consisted of 2 modes, with respondents being offered a paper survey or web option. The sampling strategy for HINTS 6

consisted of a 2-stage design (see Data S1). A total of 6252 surveys were included in the final data set. The overall weighted response rate of HINTS 6 was 28.1% (high minority, 20.8%; low minority, 31.0%).¹³

Study Population

We included adult participants with CVD or at risk of CVD. We defined the presence of CVD as an affirmative response to the survey question, “Has a doctor or other health professional ever told you that you had any of the following medical conditions: A heart condition such as heart attack, angina, or congestive heart failure? (yes/no).”¹⁴ We defined the population at risk for CVD as participants without CVD but with at least 1 CVD risk factor among hypertension, diabetes, overweight/obesity, cigarette smoking, physical inactivity, or poor sleep.

Adults with self-reported diabetes or hypertension were determined by a single question: “Has a doctor or other health professional ever told you that you had any of the following medical conditions: a. diabetes or high blood sugar; b. high blood pressure or hypertension?” The response options were “yes/no.” Adults responding “yes” were ascertained as having diabetes or hypertension. We defined overweight/obesity as a body mass index (calculated as weight in kilograms divided by height in meters squared) of at least 25 kg/m², and cigarette smoking as currently smoking every day or on some days. Physical inactivity was defined as <150 minutes of at least moderate-intensity activity each week. Physical inactivity was derived from the combination of 2 questions: “In a typical week, how many days do you do any physical activity or exercise of at least moderate intensity, such as brisk walking, bicycling at a regular pace, and swimming at a regular pace (do not include weightlifting)?” and “On the days that you do any physical activity or exercise of at least moderate intensity, how long do you typically do these activities?” Poor sleep health was defined as self-reported average sleep of <7 hours or >9 hours per night during the past 7 days, based on a single question: “During the past 7 days, how many hours of sleep did you get on average per night?”. The full HINTS 6 survey can be found elsewhere.¹⁴

Because the population of interest is adults with CVD or at risk of developing CVD, we initially excluded 304 adults without CVD and CVD risk factors. Because the outcomes of interest are engagement in SDM and the exposures of interest are patient portal access offered by HCPs, frequency of use, and encouraged to use patient portals, we then excluded 195 adults with missing data on SDM, 527 adults with missing data on patient portal access, 116 adults with missing data on patient portal frequency of use, and 22 adults with missing data on whether they were encouraged

to use patient portals. Then, we excluded 854 adults with missing data on other covariates of interest. The final analysis included 4234 adults among 6252 adult participants from HINTS 6, of which 410 had CVD and 3824 were at risk of developing CVD (see patient flow diagram in Figure S1).

Outcome of Interest

The outcome of interest of this study was the proportion of participants who reported a high level of engagement in SDM over the past 12 months. We used a single HINTS 6 item to assess participants' level of engagement in SDM: “In the past 12 months, how often did your health professional: involve you in decisions about your healthcare as much as you wanted?” Response options included “always,” “usually,” “sometimes,” and “never.” We dichotomized the variable as “High SDM: always involved in SDM” and “Low SDM: usually/sometimes/never involved in SDM” following the Healthy People 2020 objective¹⁵ and previous studies.^{16,17}

Exposures of Interest

The main exposure of interest was the proportion of participants having been offered patient portal access by their HCPs during the past 12 months, which was assessed through a single HINTS 6 item: “Have you ever been offered online access to your medical records (for example, a patient portal) by your health care provider?” Response options included “yes,” “no,” and “I don't know.” Adults who responded with “I don't know” and those with missing data for this question were excluded from the analysis. The frequency of patient portal use and the proportion of participants who were encouraged by their HCPs to use patient portals during the past 12 months were also included as exposures of interest. Frequency of patient portal use was determined by a single HINTS item: “How many times did you access your online medical record or patient portal in the last 12 months?” Response options included “0 times or I do not have a patient portal,” “1 to 2 times,” “3 to 5 times,” “6 to 9 times,” or “10 or more times.” Encouragement to use patient portals was determined by a single HINTS 6 item: “Have any of your HCPs, including doctors, nurses, or office staff ever encouraged you to use an online medical record or patient portal?” Response options included “yes” and “no.”

Study Covariates

Covariates examined included self-reported demographics, SDOH, clinical characteristics, and resources for implementing SDM. Demographic characteristics included age, sex, race, and ethnicity. The

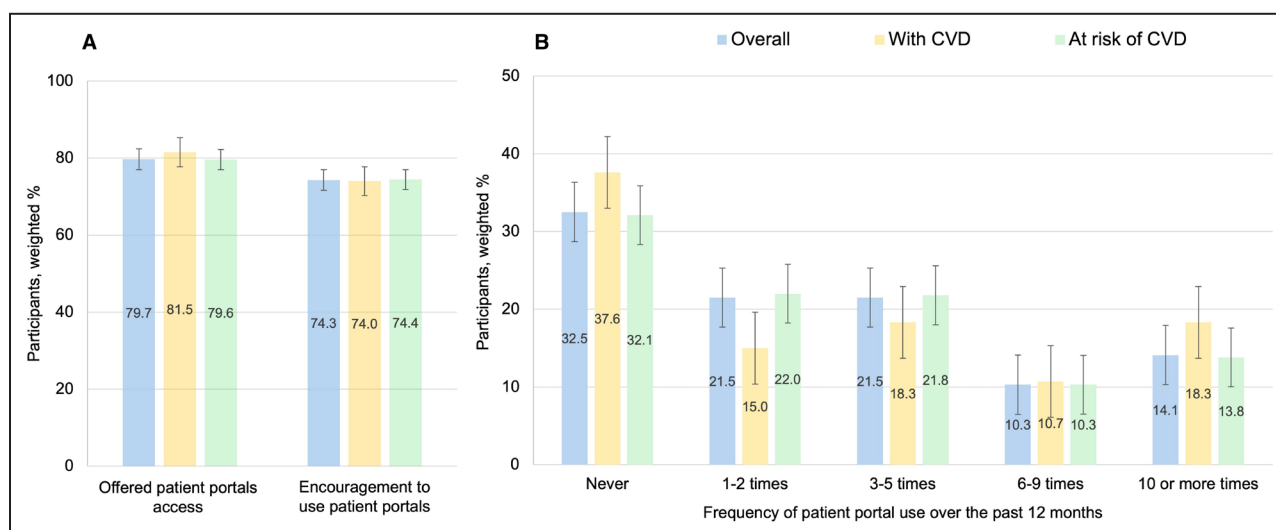


Figure 1. Weighted percentage of offering patient portal access, frequency of use, encouragement to use patient portals. **A**, Weighted percentage of offering patient portal access and encouragement to use patient portals; **(B)** Weighted percentage of the frequency of patient portal use. CVD indicates cardiovascular disease.

SDOH examined included educational attainment, annual household income, occupational status, health insurance, social risk, experienced discrimination in medical care, health literacy, marital status, and area of residence. Clinical characteristics examined included general health status, cancer, other chronic diseases, and depression or anxiety disorder. Resources for implementing SDM included internet use, receiving telehealth care, telehealth information sharing, owning digital devices, and trust in health systems. The detailed description of each covariate is summarized in Data S2.

Statistical Analysis

We described the mean±SD of age using the Stata command: “svy: mean.” We described the weighted estimated prevalence of study variables (exposures of interest and covariates) across the level of engagement in SDM (high SDM and low SDM), using survey weighting and Taylor series variance estimation.¹³ We conducted survey-weighted Pearson χ^2 tests to compare demographic characteristics and SDOH between participants included in the analysis (n=4234) and those excluded due to missing data (n=2018) (Table S1). We performed survey-weighted Pearson χ^2 tests to compare the study variables by the level of engagement in SDM. We also performed survey-weighted Pearson χ^2 tests to examine differences in patient portal use, access to patient portals offered by HCPs, and encouragement to use patient portals by HCPs across various demographic characteristics and SDOH groups.

To examine the association between exposures of interest and level of engagement in SDM, we

performed 3 weighted sequential multivariable logistic regression analyses controlling for demographics (Model 1); demographics and SDOH (Model 2); and demographics, SDOH, clinical characteristics, and resources for implementing SDM (Model 3). The differences in the relationship between patient portal access offered by HCPs and SDM were further examined within each stratum of demographics and SDOH by performing survey-weighted sequential multivariable logistic regression models. Each subgroup analysis model accounted for the frequency of patient portal use, encouragement of using patient portals, and the previously mentioned covariates. Additionally, the relationship between offering access to patient portals and encouragement to use them by HCPs and SDM was further examined based on whether adults had used or not used patient portals in the past 12 months.

We also performed weighted multivariate logistic regression models fully adjusting for all study covariates among adults with CVD and at risk of CVD separately. Finally, to account for the potential influence of HCP exposure on patient portal use and SDM, we conducted a weighted multivariate logistic regression analysis, further adjusting for the frequency of health care visits for personal care (excluding emergency room visits) in the past 12 months (<5 times versus ≥5 times, see Data S2).

The survey weighted models were performed using the Stata command: “svy: logistic.” Statistical analyses were performed using Stata/BE 18.5 (Copyright 1985–2023 Stata Corp LLC, TX: Stata Press). Adjusted odds ratios (aOR) and 95% CI were calculated. A 2-sided *P* value of <0.05 was considered statistically significant for all analyses.

RESULTS

The study included 4234 adults in HINTS during 2022, representing an estimated 177.5 million US adults. The mean age of all adults (with CVD or at risk of CVD) was 48.5 years (SD 17.1 [95% CI, 47.8–49.2]), with 50.6% [95% CI, 49.1–52.2] female and 62.8% [95% CI, 61.4–64.3] non-Hispanic White. Among the 4234 adults included in the current analyses, 410 adults (9.7% adults) had CVD, representing an estimated 13.3 million US adults. The remaining 3824 adults (90.3% adults) were at risk of CVD, representing 164.2 million US adults.

The weighted percentage of offered access to patient portals, frequency of patient portal use, and encouragement to use patient portals among adults with CVD and at risk of CVD is displayed in [Figure 1](#). Of the included adults, 3408 (79.7% [95% CI, 77.2–82.0]) adults reported having been offered access to patient portals and 3108 (74.3% [95% CI, 71.9–76.6]) reported having been encouraged to use patient portals by their HCPs over the past 12 months. Among the included adults, 2858 (67.5% [95% CI, 64.8–70.0]) used patient portals over the past 12 months.

Study Variables Across Levels of Engagement in SDM and Disparities in Patient Portals

As shown in [Table S2](#), among adults with patient portal access offered by HCPs, the weighted percentage of high level of engagement in SDM was higher than the percentage of low level of engagement in SDM (53.2% [95% CI, 50.2–56.1] versus 46.8% [95% CI, 43.9–49.8]; $P < 0.001$). Similarly, among adults who were encouraged to use patient portals, the weighted percentage of high level of engagement in SDM was higher than the percentage of low level of engagement in SDM (53.6% [95% CI, 50.6–56.6] versus 46.4% [95% CI, 43.4–49.4%]; $P < 0.001$). The frequency of patient portal use was also significantly associated with the levels of engagement in SDM. A post hoc analysis showed that adults who used the patient portal ≥ 10 times in the past 12 months were more likely to have a high level of engagement in SDM compared with those who did not (60.6% [95% CI, 54.3–66.6] versus 39.4% [95% CI, 33.4–45.7]; $P < 0.001$). Comparison of study covariates between adults with high and low levels of engagement in SDM are summarized in [Tables 1](#) and [2](#).

Disparities were observed in patient portal use, access to patient portals offered by HCPs, and encouragement to use patient portals by HCPs across various demographic characteristics and SDOH ([Tables S3–S5](#)).

Associations Between Offered Patient Portal Access and Patient Engagement in SDM

After adjusting for demographics (age, sex, race/ethnicity), adults who were offered access to a patient portal had 2.03-fold higher odds (aOR, 2.03 [95% CI, 1.32–3.13]) and adults encouraged to use it had 1.78-fold higher odds (aOR, 1.78 [95% CI, 1.25–2.52]) of having a high level of engagement in SDM compared with their counterparts (Model 1). After further adjusting for SDOH (Model 2), these associations remained significant. In the fully adjusted Model 3, which accounted for demographics, SDOH, clinical characteristics, and resources for implementing SDM, adults who were offered access to a patient portal were 2.11 times (aOR, 2.11 [95% CI, 1.34–3.32]) more likely to have a high level of engagement in SDM compared with those who were not offered access. Adults who were encouraged to use the patient portals were 1.68 times (aOR, 1.68 [95% CI, 1.15–2.45]) more likely to have a high level of engagement in SDM compared with those who were not encouraged. Frequency of patient portal use was not significantly associated with patient engagement in SDM (Models 1–3 in [Figure 2](#)). The associations between patient portal access offered by HCPs, encouragement of using patient portals, and patient engagement in SDM were significant among adults at risk of CVD ([Table S6](#)) and were not significant among adults who had CVD ([Table S7](#)). The relationship between patient portal access offered by HCPs, encouragement of using patient portals, and patient engagement in SDM remained significant after further adjusting for the frequency of health care visits in the past 12 months ([Table S8](#) and [Figure S2](#)).

Offered Patient Portal Access and Patient Engagement in SDM Across Subgroups

As shown in [Figure 3](#), the subgroup analyses showed that, compared with adults not offered access to patient portals, adults < 65 years offered patient portal access had 2.78-fold higher odds of having a high-level engagement in SDM (aOR, 2.78 [95% CI, 1.50–5.14]); women with patient portal access offered by HCPs had 2.37-fold higher odds of having a high level engagement in SDM (aOR, 2.37 [95% CI, 1.34–4.19]); non-Hispanic White adults with patient portal access offered by HCPs had 2.64-fold higher odds of having a high-level engagement in SDM (aOR, 2.64 [95% CI, 1.32–5.28]); adults with a college education or more with patient portal access offered by HCPs had 3.43-fold higher odds of having a high-level engagement in SDM (aOR, 3.43 [95% CI, 1.78–6.61]); those with high health literacy and patient portal access offered by HCPs had 3.55-fold higher odds of having a high level

Table 1. Weighted Percentage of Demographics and Social Determinants of Health Across Levels of Engagement in SDM Among US Adults With or at Risk of CVD (N=4234)

Variables	Low SDM (weighted percentage [95% CI])	High SDM (weighted percentage [95% CI])	Total (weighted percentage [95% CI])	P value
Age, y				<0.001
≥65	45.1 (41.0–49.3)	54.9 (50.7–59.0)	19.5 (18.5–20.5)	
<65	54.1 (51.2–56.9)	45.9 (43.1–48.8)	80.5 (79.5–81.5)	
Sex				0.043
Female	49.6 (46.1–53.2)	50.4 (46.8–53.9)	50.6 (49.1–52.2)	
Male	55.1 (51.5–58.6)	44.9 (41.4–48.5)	49.4 (47.8–50.9)	
Race and ethnicity				<0.001
Non-Hispanic White	46.6 (43.3–49.8)	53.4 (50.2–56.6)	62.8 (61.4–64.3)	
Non-Hispanic Black or African American	49.1 (43.3–55.0)	50.9 (45.0–56.7)	10.9 (10.0–11.8)	
Hispanic	65.8 (60.6–70.6)	34.2 (29.4–39.4)	16.0 (15.1–17.0)	
Other races [‡]	69.8 (61.5–76.9)	30.2 (23.1–38.5)	10.3 (9.2–11.4)	
Educational attainment				0.023
High School Graduate or less	58.9 (53.7–63.8)	41.1 (36.2–46.3)	25.9 (23.7–28.2)	
Some College	50.1 (45.2–55.0)	49.9 (45.0–54.8)	40.6 (38.7–42.6)	
College Graduate or More	50.0 (46.9–53.0)	50.0 (47.0–53.1)	33.5 (32.3–34.7)	
Annual household income				0.295
Less than \$35 000	54.8 (48.9–60.6)	45.2 (39.4–51.1)	22.5 (20.5–24.7)	
\$35 000 to <\$75 000	54.4 (49.5–59.2)	45.6 (40.8–50.5)	31.2 (28.7–33.8)	
\$75 000 or More	49.7 (45.2–54.2)	50.3 (45.8–54.8)	46.3 (43.9–48.7)	
Occupational status				0.253
Not employed	50.4 (45.9–54.9)	49.6 (45.1–54.1)	39.0 (36.0–42.2)	
Employed	53.5 (50.6–56.4)	46.5 (43.6–49.4)	61.0 (57.8–64.0)	
Health insurance				<0.001
No	75.7 (69.0–81.4)	24.3 (18.6–31.0)	10.2 (9.1–11.4)	
Yes	49.7 (46.9–52.5)	50.3 (47.5–53.1)	89.8 (88.6–90.9)	
Skipped meals due to lack of money for food				<0.001
Often/Sometimes	65.8 (57.6–73.2)	34.2 (26.8–42.4)	15.8 (13.4–18.6)	
Never	49.8 (47.2–52.4)	50.3 (47.6–52.8)	84.2 (81.4–86.6)	
Cannot afford to eat balanced meals				<0.001
Often/Sometimes	67.8 (61.7–73.4)	32.2 (26.6–38.3)	17.8 (15.4–20.5)	
Never	48.9 (46.3–51.6)	51.1 (48.4–53.7)	82.2 (79.5–84.6)	
Worried about being forced to move				0.002
Often/Sometimes	65.9 (58.0–73.0)	34.1 (27.0–42.0)	11.4 (9.7–13.3)	
Never	50.6 (47.9–53.3)	49.4 (46.7–52.1)	88.6 (86.7–90.3)	
Lack of reliable transportation				<0.001
Often/Sometimes	69.3 (61.6–76.1)	30.7 (23.9–38.4)	12.9 (10.7–15.5)	
Never	49.8 (47.2–52.4)	50.2 (47.6–52.8)	87.1 (85.6–89.3)	
Social risk [†]				<0.001
0 Social risk factor	48.1 (45.3–50.8)	51.9 (49.2–54.7)	74.5 (71.7–77.2)	
≥1 Social risk factors	64.8 (60.2–69.2)	35.2 (30.8–39.8)	25.4 (22.8–28.3)	
Experienced discrimination in medical care				<0.001
No	50.7 (48.1–53.3)	49.3 (46.7–51.9)	92.8 (91.3–94.1)	
Yes	73.0 (62.8–81.2)	27.0 (18.8–37.2)	7.2 (5.9–8.7)	
Health literacy				<0.001
Low	62.2 (57.9–66.4)	37.8 (33.6–42.1)	39.9 (37.5–42.3)	
High	45.7 (42.4–49.1)	54.3 (50.9–57.6)	60.1 (57.7–62.5)	
Marital status				0.002
Non-married	56.6 (53.1–60.0)	43.4 (40.0–46.9)	47.3 (45.6–48.9)	
Married	48.5 (45.1–51.9)	51.5 (48.1–54.9)	52.7 (51.1–54.4)	
Area of residence				0.378
Rural	49.8 (43.8–55.7)	50.2 (44.3–56.2)	12.5 (11.3–13.9)	
Urban	52.7 (50.0–55.3)	47.3 (44.6–50.0)	87.5 (86.1–88.7)	

High SDM, always involved in SDM; Low SDM, usually/sometimes/never involved in SDM; and SDM, shared decision-making. CVD indicates cardiovascular disease; and SDM, shared decision-making.

[‡]Other races include Non-Hispanic American Indian or Alaska, Non-Hispanic Native Hawaiian, Non-Hispanic Multiple Races.

[†]Social risk: reducing the size of meals, skipping meals due to insufficient money for food, inability to afford balanced meals, and concerns about forced relocation or lack of transportation.

Table 2. Weighted Percentage of Clinical Characteristics and Resources of Implementing SDM Across Different Levels of Engagement in SDM Among US Adults With or at Risk of CVD (N=4234)

Variables	Low SDM (weighted percentage [95% CI])	High SDM (weighted percentage [95% CI])	Total (weighted percentage [95% CI])	P value
Clinical characteristics				
General health status				<0.001
Excellent	42.2 (32.0–53.0)	57.8 (47.0–68.0)	9.8 (8.1–11.7)	
Very good	47.0 (42.1–51.9)	53.0 (48.1–57.9)	35.8 (33.4–38.3)	
Good	55.9 (51.5–60.1)	44.1 (39.9–48.5)	38.4 (35.8–41.0)	
Fair	59.7 (52.2–66.8)	40.3 (33.2–47.8)	13.8 (12.1–15.6)	
Poor	75.7 (61.7–85.7)	24.3 (14.3–38.3)	2.3 (1.7–3.1)	
Cancer				0.007
No	53.1 (50.7–55.5)	46.9 (44.5–49.3)	89.8 (89.2–90.4)	
Yes	45.5 (40.0–51.0)	54.5 (49.0–60.0)	10.2 (9.6–10.8)	
Other chronic diseases*				0.814
No	52.4 (49.7–55.1)	47.6 (44.9–50.3)	88.0 (86.6–89.2)	
Yes	51.6 (45.0–58.0)	48.4 (42.0–55.0)	12.0 (10.8–13.4)	
Depression or anxiety				0.954
No	52.4 (49.7–55.0)	47.6 (45.0–50.3)	71.1 (68.5–73.6)	
Yes	52.2 (47.1–57.3)	47.8 (42.7–52.9)	28.9 (26.4–31.5)	
Resources for implementing SDM				
Internet use				0.063
No	58.3 (52.1–64.3)	41.7 (35.7–47.9)	9.7 (8.5–11.0)	
Yes	51.7 (49.0–54.3)	48.3 (45.7–51.0)	90.3 (89.0–91.5)	
Received telehealth care				0.038
No	54.6 (52.1–57.0)	45.4 (43.0–48.0)	59.0 (56.2–61.8)	
Yes	49.1 (44.6–53.6)	50.9 (46.4–55.4)	41.0 (38.2–43.8)	
Telehealth information sharing				<0.001
No	55.0 (52.4–57.6)	45.0 (42.4–47.6)	79.3 (76.9–81.5)	
Yes	42.1 (36.2–48.3)	57.9 (51.7–63.8)	20.7 (18.5–23.1)	
Owned digital devices†				0.373
No	47.3 (36.9–58.0)	52.7 (42.0–63.1)	4.9 (4.0–6.0)	
Yes	52.6 (50.0–55.2)	47.4 (44.8–50.0)	95.1 (94.0–96.0)	
Trust in health systems				<0.001
Somewhat/a little trustful	62.7 (59.6–65.8)	37.3 (34.2–40.4)	63.4 (61.0–65.7)	
Very trustful	34.3 (30.6–38.2)	65.7 (61.8–69.4)	36.6 (34.3–39.0)	

High SDM, always involved in SDM; Low SDM, usually/sometimes/never involved in SDM; and SDM, shared decision-making. CVD indicates cardiovascular disease; and SDM, shared decision-making.

*Other chronic diseases: chronic lung disease, asthma, emphysema, or chronic bronchitis.

†Owned digital devices: tablet computer, smartphone, or multiple devices.

engagement in SDM (aOR, 3.55 [95% CI, 2.00–6.30]); employed adults with patient portal access offered by HCPs had 2.56-fold higher odds of having a high level engagement in SDM (aOR, 2.56 [95% CI, 1.28–5.13]); and those living in urban areas with patient portal access offered by HCPs had 2.36-fold higher odds of having a high level engagement in SDM (aOR, 2.36 [95% CI, 1.39–4.00]). Interestingly, adults in the lowest-income group (<\$35 000) with patient portal access offered by HCPs were 3.66 times more likely to engage in SDM (aOR, 3.66 [95% CI, 1.45–9.25]); and adults

who were not married and who had patient portal access offered by HCPs were 2.58 times more likely to engage in SDM (aOR, 2.58 [95% CI, 1.34–4.97]) compared with those not offered access.

Offering access to patient portal by HCPs was associated with higher SDM among adults who did not use patient portals (aOR, 2.58 [95% CI, 1.45–4.60]; Table S9), while encouragement to use patient portals by HCPs was associated with higher SDM among adults who used patient portals over the past 12 months (aOR, 2.08 [95% CI, 1.34–3.22]; Table S10).

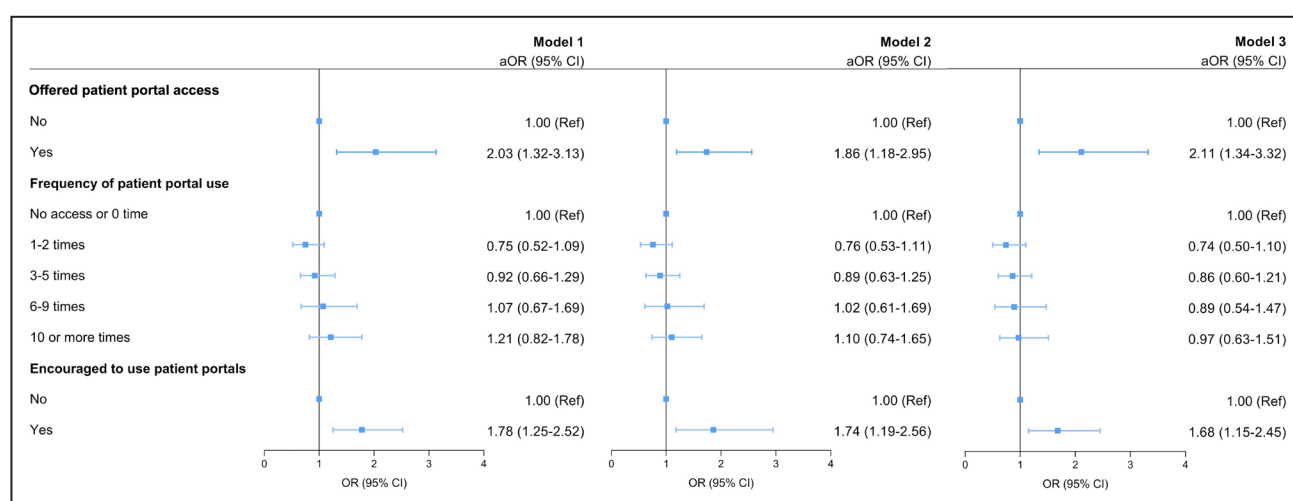


Figure 2. Patient portal access offered by HCPs, frequency of use, encouragement to use patient portals, and SDM.

Model 1: adjusted for demographics (age, sex, race/ethnicity). Model 2: adjusted for demographics and SDOH (education, income, health literacy, employment, marital status, area of residence, social risk). Model 3: adjusted for demographics, SDOH, clinical characteristics (general health status, cancer, lung disease, depression), and resources for implementing SDM (receipt of telehealth care, had digital devices, internet use, sharing health information from device or smartphone with health professional, trust in health system). aOR indicates adjusted odds ratio; CVD, cardiovascular diseases; HCPs, health care providers; OR, odds ratio; SDM, shared decision-making; and SDOH, social determinants of health.

DISCUSSION

In this cross-sectional study based on a representative sample of US adults with or at risk of CVD, we found that adults who were offered access to patient portals by their HCPs were more than twice as likely to engage in SDM compared with those who were not. The extent of this association varied by demographics and SDOH. Furthermore, adults who were encouraged to use patient portals by HCPs were 68% more likely to engage in SDM compared with those who were not. However, the frequency of patient portal use was not significantly associated with SDM.

Despite the rising popularity of patient portals, there has been limited investigation into the relationship between offering access to patient portals by HCPs and patient's engagement in SDM, and the disparities of this relationship across demographic characteristics and SDOH.¹⁸ To the best of our knowledge, this study is the first study to investigate those associations among adults with CVD or at risk of CVD, using the most recent data from the HINTS, the largest nationally representative survey of health technology utilization among US adults. Our results suggest that offering access to patient portals and encouraging their use by HCPs are associated with greater engagement in SDM. This finding is an important focus for ongoing research and aligns with existing literature highlighting the pivotal role of clinician–patient interactions in adopting health technologies including patient portals.^{19–21} There are limited studies to compare our findings to^{4,8,22,23}; however, some retrospective cohort studies suggested

that providing patients with access to patient portals was associated with significantly improved CVD risk factor management.^{22,23} It is important to note that, given the cross-sectional nature of our study, the study cannot determine causal relationship between offering access to patient portals and encouragement to use them by HCPs and patient engagement in SDM. The relationship between HCPs offering access to patient portals and encouraging their use with SDM may also be bidirectional. That is, adults who are highly engaged in SDM may be more likely to use patient portals and perceive encouragement from their HCPs, and more likely to have a positive perception of their health and health care related–quality of life.^{2,24} Future research is needed to further explore whether the relationship between offering access to patient portals and encouragement to use them by HCPs and patient engagement in SDM is causal, and if so, to examine the nature and directionality of that causality.

Our study showed that the associations between offering access to patient portals and patient engagement in SDM differed by demographics and SDOH. The observed disparities could be attributed to several factors, including differences in socioeconomic disparities and accessibility of patient portals.^{25–28} Previous studies using the HINTS datasets indicated that adults being offered patient portals by HCPs and access to patient portals increased significantly from 2014 to 2022, but sociodemographic inequities in portal access persist.^{25–27} Specifically, adults who are male, lack a college degree, have Medicaid insurance, do not have a regular provider, lack internet access, or

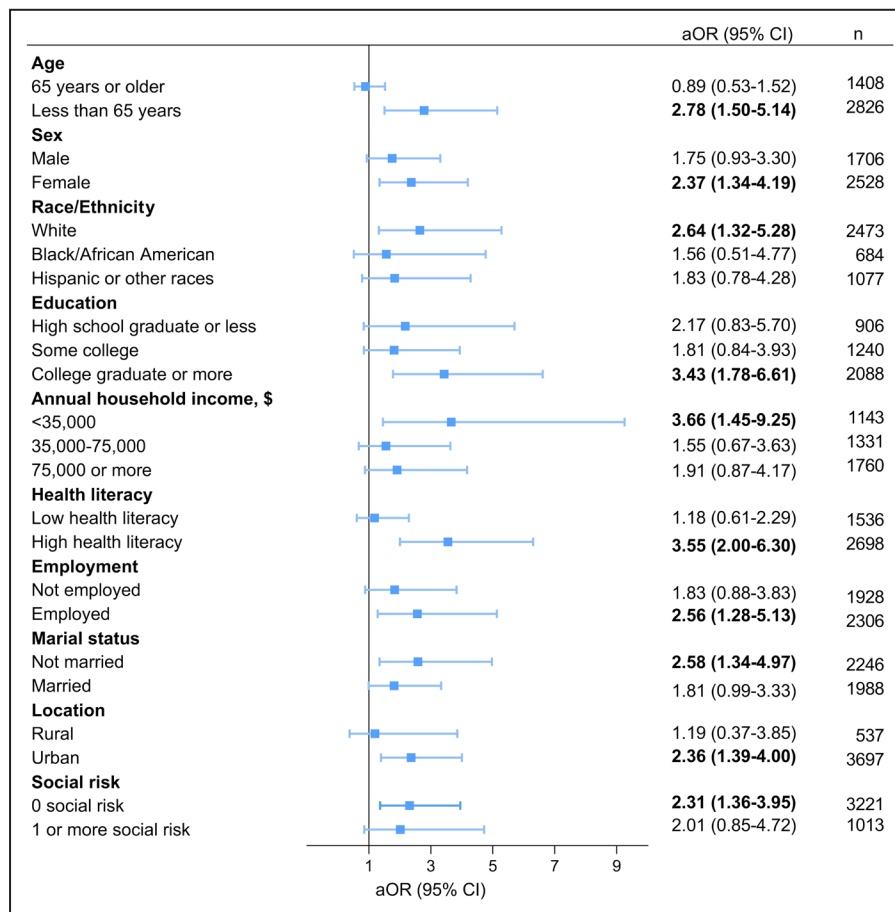


Figure 3. Odds ratios of patient portal access offered by HCPs for SDM within subgroups.

The models of each subgroup adjusted for demographics, SDOH, clinical characteristics (general health status, cancer, lung disease, and depression), and resources for implementing SDM (receipt of telehealth care, had digital devices, internet use, sharing health information from device or smartphone with health professional, and trust in health system). All models included exposure variables. Bold: P value < 0.05. aOR indicates adjusted odds ratio; HCPs, health care providers; SDM, shared decision-making; and SDOH, social determinants of health.

live in rural areas are less likely to report using a portal compared with their counterparts.^{25,26,29} Some studies found that compared with non-Hispanic White adults, non-Hispanic Black and Hispanic adults were less likely to be offered access to patient portals by HCPs and to be encouraged to use them.^{9,26,27} Our study also investigated significant differences in patient portal use, offered access to patient portals and encouraged to use them by HCPs across demographic characteristics and SDOH including age, sex, race and ethnicity, educational attainment, income, occupational status, health insurance, social risk, health literacy, marital status, and area of residence. These disparities may contribute to variations in the relationship between patient portal use, offering access to patient portals and encouragement of using patient portals by HCPs, and the level of SDM. To reduce these disparities and

optimize the benefits of patient portals for facilitating SDM,^{2,30} future studies should examine the potential impact of demographic factors and SDOH on the relationship between patient portals and SDM.

Interestingly, our study found that the frequency of patient portal use was not associated with increased SDM. This suggests that merely being offered access to patient portals and being encouraged to use them by HCPs may have a stronger association with SDM than the frequency of use. After stratifying by patient portal use, the results indicated that offering portal access by HCPs was linked to higher SDM among adults who had not used portals, suggesting that providing access alone may signal an effort to engage patients in SDM. Among adults who had used portals, HCP encouragement to use them was associated with higher SDM, emphasizing the importance of reinforcing patient

portal use to further engage patients in SDM. These interactions likely strengthen the patient–provider partnership and empower patients to take a more active role in SDM. Regardless, this finding warrants further investigation to understand the underlying reasons and to identify strategies that can maximize the impact of patient portals on patient engagement in SDM. One potential reason might be that the trust in using the patient portals and the quality of interactions facilitated through the patient portal might be more important for SDM than how often the patient portal is used.²¹ Similarly, adults who were offered and encouraged to use patient portals by HCPs may be more likely to develop trust, foster a high-quality clinician–patient relationship, and feel more engaged in SDM as a result.^{19,20} However, the results of this study should be cautiously interpreted because access to online medical records does not necessarily mean that an adult had patient portal access that allowed for bidirectional communication with their HCPs. Future interventional or observational studies are needed to examine the role of bidirectional communication through online patient portals in relation to SDM among adults with chronic diseases.

Limitations

This study has several limitations. First, the cross-sectional nature of the study limits our ability to establish causal relationships between patient portal access and use and engagement in SDM. In addition, there is a potential for response bias due to self-reported data. Nonetheless, the study instruments are validated and were part of a large National Institutes of Health study, which used the best available methods to address these questions. Moreover, we addressed this by applying survey weighting methods recommended by HINTS methodology. Third, the response rate for the HINTS during 2022 was ≈28%, which could introduce nonresponse bias. However, this response rate is comparable to other population-based surveys using similar methods, and survey weights are used to adjust for nonresponse. Finally, the substantial amount of missing data in our variables of interest introduces potential bias.

CONCLUSIONS

Offering access to patient portals by HCPs was significantly associated with higher engagement in SDM among US adults with or at risk of CVD, with the associations varying by demographics and SDOH. HCPs' encouragement to use patient portals was also associated with increased engagement in SDM. Future research is needed to further investigate the causal relationship between patient portal access and use

and patient engagement in SDM, as well as to explore the role of bidirectional communication through patient portals in relation to SDM among adults with chronic diseases.

ARTICLE INFORMATION

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Disclosures

None.

Supplemental Material

Data S1–S2
Tables S1–S10
Figures S1–S2

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