Health-Related Goal Setting and Achievement Among Veterans with High Technology Adoption

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BACKGROUND: There is increasing recognition of the importance of supporting patients in their health-related goals. Patient-provider discussions and health-related mobile applications (apps) can support patients to pursue health goals; however, their impact on patient goal setting and achievement is not well understood.

OBJECTIVE: To examine the relationships between the following: (1) patient demographics, patient-provider discussions, and health-related goal setting and achievement, and (2) patient mobile health app use and goal achievement.

DESIGN: Cross-sectional survey.

PARTICIPANTS: Veterans who receive Veterans Health Administration (VA) healthcare and are users of VA patient-facing technology.

MAIN MEASURES: Veteran demographics, goal-related behaviors, and goal achievement.

METHODS: Veterans were invited to participate in a telephone survey. VA administrative data were linked to survey data for additional health and demographic information. Logistic regression models were run to identify factors that predict health-related goal setting and achievement.

KEY RESULTS: Among respondents (*n*=2552), 75% of patients indicated having set health goals in the preceding 6 months and approximately 42% reported achieving their goal. Men (vs. women) had lower odds of setting goals (OR: 0.71; CI95: 0.53–0.97), as did individuals with worse (vs. better) health (OR: 0.18; CI95: 0.04–0.88). Individuals with advanced education—some college/college degrees, and post-college degrees (vs. no college education)—demonstrated higher odds of setting goals (OR: 1.35; CI95: 1.01–1.79; OR: 1.71; CI95: 1.28–2.28, respectively). Those who reported having discussed their goals with their providers were more likely to set goals (OR: 3.60; CI95: 2.97–4.35). Patient mobile health app use was not statistically associated with goal achievement.

CONCLUSIONS: Efforts to further promote patient-led goal setting should leverage the influence of patient-provider conversations. Use of patient-facing technologies, specifically mobile health apps, may facilitate goal-oriented care, but further work is needed to examine the potential benefits of apps to support patient goals, particularly if providers discuss and endorse use of those apps with patients.

KEY WORDS: goal setting; patient engagement; technology; mobile health apps; Veterans.

INTRODUCTION

Empowering patients to take control of their health may facilitate lasting behavioral change.[1] Encouraging patient engagement can take many practical forms. For instance, patients can be involved in developing healthcare plans or health-related goals in partnership with their providers, rather than having their providers make these decisions for them.[1] Patients who are engaged in the process of setting their own health-related goals may be more committed to achieving these goals; this commitment can have a positive influence on care processes and outcomes.

Patient-led goal setting can improve various health outcomes such as weight reduction,[2] chronic low back pain and associated quality of life,[3] and psychological health.[4] How goals are formulated may directly impact goal achievement. Evidence suggests goals that are specific, measurable, achievable, realistic/relevant, and timed (SMART) are among the most likely to be achieved.[5] Without in-depth patient-provider discussion, providers may set goals for their patients that are too broad (e.g., "exercise more") or not appropriately attainable (e.g., "lose 50 pounds by your next annual check-up").[6] When patients are not appropriately engaged in the goal-setting process, provider-derived goals may fail to address factors most important to the patient, resulting in patients not prioritizing those goals. A previous work has highlighted the potential disconnect between patients and healthcare providers in setting health-related goals, with some providers feeling like they do not have enough time to talk to patients about goal setting, and, conversely, patients thinking that providers are not interested in helping them set goals.[6,7]

In recent years, there has been an explosion of patient-facing, health-related mobile applications (apps) that are designed to engage, empower, and support patients to improve their well-being. In many cases, these apps can help patients set, track, and pursue personal health goals.[8] Despite their increasing prevalence, however, research exploring how such apps can best support patients with setting and achieving health-related goals remains limited.

Focusing on a patient's personal health goals in the context of their symptoms, physical-functional status, and social role offers an individualized approach to making healthcare decisions, assessing outcomes, and measuring success.[9] Veterans receiving care through the VA often have multiple significant comorbidities. These Veterans would likely benefit from a patient-centered approach to setting and working towards specific health goals. In this paper, we examine the relationships between patient demographics, patient-provider discussions, and health-related goal setting and achievement, and begin to explore potential relationships between patient mobile health app use and goal achievement. We examined these relationships in a sample of Veterans who receive VA health care and are users of VA patient-facing technology.

METHODS

Design

Recently, VA launched a novel effort to develop and maintain a cohort of Veterans willing to provide feedback on the latest VA connected-care technologies to improve their usability, adoption, and meaningful integration into practice. Referred to as the "Veterans Engagement with Technology Collaborative" (VET-C) cohort, the long-term purpose of this effort is to offer new infrastructure for VA leadership and program evaluators, and to directly engage Veterans in the evaluation of VA technologies that are intended to increase access, enhance coordination, and support self-management.[10] We used the VET-C cohort to examine the relationships between patient characteristics, patient-provider discussions, and patient mobile health app use on health-related goal setting and achievement.

Recruitment

To be eligible to join the VET-C cohort, Veterans had to be users of VA healthcare services, have a cellular phone (i.e., smartphone, feature phone, basic phone), and be active users of Veteran-to-clinical team electronic communication through the secure messaging feature of VA's My Health*e*Vet patient portal. Active use of electronic communication was defined as having sent at least 5 secure messages to VA clinical team members through My Health*e*Vet in the previous year and was used as a proxy for more general use of VA patient-facing technologies. These sample selection criteria were used to increase the likelihood that the VET-C cohort represented Veterans with high technology adoption.

Veterans were recruited from VA facilities spread geographically across the VA service regions of the USA, including a mix of urban and rural locations. Specific facilities were chosen as recruitment sites because they (1) had high rates of secure messaging, (2) served as field-test sites for other new VA patient-facing technologies, (3) were known to serve populations of Veterans from diverse ethnic groups, or (4) had active research and evaluation programs. Nearly 2800 Veterans from 14 VA facilities joined the VET-C cohort and provided baseline data.

Procedures

Recruitment lists were created by querying data from the VA Corporate Data Warehouse (CDW). Veterans on recruitment lists were called one time by the evaluation team. Those the team reached were told about the purpose of the VET-C cohort and invited to join. Veterans who were interested completed a telephone survey and evaluation team members entered their responses into REDCap, a secure online database. For this paper, constructs of interest from the survey included Veteran demographics, goal-setting behaviors, patient-provider discussions, and use of information and communication technologies (including mobile health apps). All participants were asked, "In the last 6 months, did anyone in your VA provider's office talk with you about specific goals for your health?" and "In the past 6 months, have you set any goals related to your health?" For those who set a goal, participants were asked, "What health-related goal or goals have you made in the past 6 months" (open-ended); "Have you been able to achieve this health-related goal?"; and "Have you used an app on a smartphone or tablet to help you achieve/work on this health-related goal?" Those participants who reported setting more than one goal were asked to indicate which goal was most important to them. In subsequent analyses, this was referred to as a participant's primary goal. All participants

responded to demographic questions (age, gender, race, ethnicity, relationship status, education) and reported perceived health status. We calculated participants' prior-year Hierarchical Condition Community (HCC) comorbidity index scores, which were based on information in the VA CDW including gender, chronic health conditions, age, and eligibility for Medicare/Medicaid services.[11,12] The CDW was also used to fill in additional health information (e.g., select diagnoses), missing age, and gender data. The cohort diagram and inclusion criteria for the analyses are portrayed in Figure 1.

Analyses

Descriptive statistics were used to characterize Veteran demographics, goal-setting behaviors, goal achievement, and app use. We also examined types of goals set by participants and rates of achievement for different types of goals through content coding open-ended responses. We first developed a codebook of goal categories based on goal types prominent in the data. Using that codebook, two members of our evaluation team independently coded each goal and compared codes; discrepancies were discussed and resolved until agreement was reached on each code.

We then conducted a series of analyses to assess patient and provider factors associated with the setting and achieving of health-related goals. We ran separate logistic regression models to predict goal setting and achievement for our overall sample. To examine the unadjusted associations between the outcome variables and independent variables of interest, we estimated unadjusted logistic regression models. We then ran adjusted models, which controlled for the impact of key demographic variables (i.e., gender, age, race, ethnicity, relationship status, education), perceived health status, and prior-year HCC score on goal setting and achievement, as well as use of mobile health apps on goal achievement. To explore the possibility that app use might have a different association with goal achievement for Veterans who did and did not engage in health-related goal discussions with their providers, we also included an interaction term between app use and goal-setting discussions in the goal achievement model. In addition, to explore potential differences in factors associated with goal achievement based on mobile health app use, we ran separate logistic regression models to predict goal achievement among mobile health app users and non-users. Statistical analyses were performed with STATA MP Version 14.2 software (StataCorp, College Station, TX). This work was reviewed by the Institutional Review Boards at the Edward Hines Jr. VA Hospital in Hines, IL, and the VA Bedford Healthcare System in Bedford, MA, and designated as program evaluation for quality improvement purposes, exempting it from further oversight (VA Handbook 1058.05).
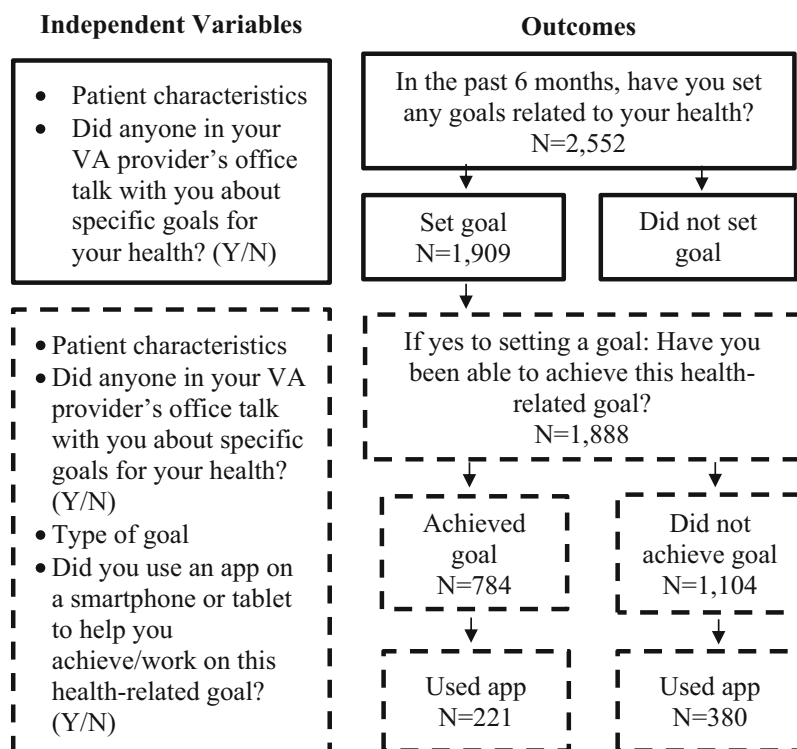
1. The solid-line boxes represent the analyses including all participants who did or did not set a goal. The dashed-line boxes represent the analyses only including participants who did set a goal.

Figure 1 Statistical analyses diagram. **The solid-line boxes represent the analyses including all participants who did or did not set a goal. The dashed-line boxes represent the analyses only including participants who did set a goal.**

RESULTS

Sample Demographics (Table 1)

Overall, a majority of our sample was male (83.2%), aged 46 to 75 years (77.7%), and of white race (83.1%) and non-Hispanic ethnicity (95.2%).

Goal Setting, Goal Achievement, and App Use Frequencies

Among our cohort (n=2552), 75% of Veterans indicated having set health goals in the prior 6 months. Of the 1909 participants who reported setting a goal, 1888 (98.9%) reported a specific primary goal and whether they achieved their goal. Overall, 42% (n=784) of goal-setters reported achieving their primary goal. Among those who reported achieving their goal, 28% used an app to help them achieve the goal, whereas, among those who did not report achieving their goal (n=1104), 34% used an app to work towards their goal.

Types of Goals and Rates of Goal Achievement (Table 2)

Using VA administrative data, we identified conditions related to the top three goals set by participants—body mass index (BMI) over 30 (which indicates obesity), smoking status, and diabetes diagnosis. Approximately 77% of our sample had a BMI over 30, about 18% were current smokers, and nearly 36% had a diabetes diagnosis. The most commonly reported goals among our sample were related to weight management/physical activity (68%), smoking cessation (6.4%), and diabetes management (6.4%). Approximately 40% of participants reported achieving their weight management/physical activity goal, about 36% reported achieving their smoking cessation goal, and about 53% reported achieving their diabetes management goal.

Factors Associated with Goal Setting and Goal Achievement (Tables 3 and 4)

Goal Setting. Results of our adjusted regression models found that men had decreased odds of goal setting compared to women (OR: 0.71; CI95: 0.53–0.97). In addition, individuals who were in worse health (i.e., those who had higher HCC scores) had decreased odds of goal setting (OR: 0.18; CI95: 0.04–0.88). Individuals with advanced education—some college/college graduate, and post-college degrees (vs. no college education)—demonstrated higher odds of setting goals (OR: 1.35; CI95: 1.01–1.79 and OR: 1.71; CI95: 1.28–2.28, respectively). Finally, the strongest positive association emerged between talking with a VA provider about health goals and having set a goal (OR: 3.60; CI95: 2.97–4.35).

Goal Achievement. Results of our adjusted regression models found that individuals with less than very good self-reported health status had lower odds of goal achievement. The type of goal set by respondents was also associated with different odds of goal achievement. Respondents who set goals related to weight management/physical activity, pain/musculoskeletal management, and smoking cessation (vs. general healthcare management) were less likely to report goal achievement; those who set medication management goals were more likely to report goal achievement. Similar to goal-setting results, talking with VA providers was positively associated with goal achievement, but the relationship was not significant. The use of an app to achieve/work on a health-related goal had a significant negative effect in the unadjusted model, but when other factors were controlled for in the adjusted model, the effect was no longer significant. The interaction term between use of an app and talking with VA providers about goals was not significantly associated with goal achievement.

We used adjusted logistic regression models predicting goal achievement to separately examine respondents who reported having used mobile health apps and those who did not report app use. Among app users, individuals who reported being in good or poor (vs. excellent) health had significantly lower odds of goal achievement. Among app non-users, those who reported higher (vs. lower) SES had significantly greater odds of goal achievement; whereas those who reported being in good, fair, or poor (vs. excellent) health had significantly lower odds of goal achievement. The type of goal set by app non-users was also associated with significantly different odds of goal achievement. Respondents who set goals related to weight management/physical activity, pain/musculoskeletal management, and smoking cessation (vs. general healthcare management) were significantly less likely to report goal achievement. Thus, there may be different factors influencing goal achievement in those using mobile health apps, and those who have not used mobile health apps.

DISCUSSION

We collected goal-setting data from a national sample of Veterans. The complexity of Veterans' healthcare needs is reflected in our data, as respondents reported a wide range of goals related to their health concerns and priorities. Most Veterans in our sample reported having set a goal, and the most common goals were related to weight management/physical activity, smoking cessation, and diabetes management. Of note, the goals set among our respondents were not wholly reflective of prevalent problems that exist in the Veteran population. For example, although sleep disturbance is very common among Veterans,[13] addressing sleep disturbance was not often reported as a goal in this evaluation. Overall, only 42% of Veterans reported achieving their primary goal.

Our data also suggested that goals were achieved at different rates; goals related to weight management/physical

Table 1 Demographics (*n*=2552)

Characteristic	n (%)
Age	
<45	380 (14.9)
46–65	1020 (40.0)
66–75	963 (37.7)
>75	189 (7.4)
Gender	
Male	2122 (83.2)
Female	430 (16.8)
Race	
White	2121 (83.1)
Black	306 (12.0)
Other	125 (4.9)
Ethnicity	
Hispanic or Latino	123 (4.8)
Not Hispanic or Latino	2429 (95.2)
Relationship status	
Married	1645 (64.5)
Other	907 (35.5)
Education	
High school graduate or less[1]	331 (13.0)
Some college/college graduate[2]	1105 (43.3)
Master's/professional school/doctoral degree[3]	1116 (43.7)
Financial difficulty	
Not very hard	1754 (68.7)
At least somewhat hard	798 (31.3)
Perceived health status	
Excellent	136 (5.3)
Very good	493 (19.3)
Good	983 (38.5)
Fair	742 (29.1)
Poor	198 (7.8)
Prior-year Hierarchical Condition Community score	Mean = 0.30 SD = 0.11 Range [0.08–0.96]

[1]*Includes less than 8th grade; some high school (grades 9–12, no degree); high school graduate (or equivalent such as GED)*
[2]*Includes some college or vocational school (1–4 years); associate's degree; bachelor's degree (BA, BS, AB, etc.)*
[3]*Includes master's degree (MA, MS, MENG, MSW, etc.); professional school degree (MD, DDC, JD, etc.); doctoral degree (PhD, EdD, etc.)*

Table 2 Types of Primary Goals, Their Achievement and Influencing Factors (*n*=1888)

Main goal	n	% of total who set goal	Achieved this goal (%)	Used an app (%)	Talked to VA provider about goal (%)
Weight management/ physical activity	1284	68.0	39.9	36.2	66.4
Smoking cessation	121	6.4	36.4	6.6	86.0
Diabetes management	120	6.4	53.3	30.8	85.0
Pain/ musculoskeletal management	97	5.1	23.7	17.5	67.0
Medication management	61	3.2	65.6	23.0	67.2
General healthcare management (other)[1]	205	10.9	49.3	29.3	73.2

[1]*Includes whole health (n=58), care management (n=42), mental health or reduce anxiety/stress (n=26), blood pressure maintenance (n=20), reduce/quit drinking (n=18), cholesterol maintenance (n=17), improve sleep (n=5), rehabilitation (n=4), other goals (n=15)*

activity, pain/musculoskeletal management, and smoking cessation were less likely to be achieved by participants, compared with medication management goals. These findings suggest there may be inherent differences between types of health-related goals that may make them more or less likely to be achieved. Goals related to weight management, for example, are multifaceted and involve complex behavior change across multiple potential domains (e.g., psychological health, fitness, nutrition, sleep, medication). Achieving improvements to medication management, on the other hand, may require more simple behavior change. In this work, the differences in goal achievement across types of goals highlight the importance of developing patient-centered interventions that account for the complexity of the behavior change(s) needed to meet the goal(s) at hand. This may be particularly important for those who are not inclined to use mobile health apps; these patients may especially benefit from a well-rounded behavioral health approach from a team of providers.

Our results suggest that men may be less likely to set goals than women Veterans. In contrast, a recent study focused on health coaching and health-related risks reported no gender differences in health-related goal setting or completion.[14] The gender differences in goal-setting that we observed may have underlying causes, which were not directly explored in our data collection efforts. Future work should examine reasons why men may be less likely than women to set health-related goals. Encouragingly, our results did not reveal gender differences in goal achievement, suggesting that by accounting for gender differences, VA healthcare providers can better customize the goal-setting experience to maximize behavior change.

Our results also suggest that Veterans with more years of education were more likely to set goals than those with fewer years. These findings are consistent with research demonstrating the link between sociodemographic characteristics and health status/behavior, where individuals with lower levels of education and income tend to experience higher rates of mortality.[15,16] Additionally, some evidence suggests that individuals with higher education conceptualize their involvement in the healthcare process as sharing responsibility with the doctor, in contrast to those with lower education, who may believe their role is limited to agreeing or disagreeing with the doctor's recommendation.[17]

Combined with past research, our findings highlight the importance of providers engaging patients with lower levels of educational attainment in goal-setting conversations. Provider teams can encourage patients (at any level of educational attainment) to participate in setting goals and developing a plan for achieving those goals by incorporating open-ended questions into patient-provider conversations. Examples of such questions could include "What health-related changes could make the most difference in your life?"; "What do you plan to do to make those changes?"; and "How can we support you in achieving these goals?" Provider elicitation and reaction to the patient perspective can empower the patient to take

Table 3 Characteristics Associated with Goal Setting (*n*=2552) and Achievement (*n*=1888): ORs and 95% CI Levels

	Goal setting (*n*=2552)		Goal achievement (*n*=1888)	
	Unadjusted	**Adjusted**	**Unadjusted**	**Adjusted**
Characteristic				
Gender				
Female (ref)	–	–	–	–
Male	0.69** (0.53–0.89)	0.71* (0.53–0.97)	1.15 (0.91–1.47)	–
Age				
<45 (ref)	–	–	–	–
46–65	1.01 (0.7–1.34)	1.16 (0.80–1.69)	0.79 (0.60–1.04)	–
66–75	0.78 (0.59–1.03)	1.22 (0.77–1.95)	1.22 (0.92–1.61)	–
>75	0.47*** (0.32–0.68)	1.04 (0.48–2.23)	1.38 (0.90–2.13)	–
Race				
White (ref)	–	–	–	–
Black	1.70** (1.25–2.32)	1.35 (0.97–1.88)	0.72* (0.54–0.95)	0.80 (0.60–1.07)
Other	1.71* (1.07–2.73)	1.58 (0.97–2.59)	1.16 (0.77–1.74)	1.18 (0.77–1.81)
Hispanic				
Non-Hispanic (ref)	–	–	–	–
Hispanic	1.41 (0.89–2.22)	–	0.98 (0.64–1.49)	–
Relationship status				
Non-married (ref)	–	–	–	–
Married	1.16 (0.96–1.41)	–	0.90 (0.74–1.09)	–
Education level				
High school graduate or less (ref)	–	–	–	–
Some college/college graduate	1.41* (1.08–1.85)	1.35* (1.01–1.79)	1.17 (0.86–1.57)	–
Masters/professional/doctoral	1.60** (1.22–2.09)	1.71*** (1.28–2.28)	1.28 (0.95–1.74)	–
Socioeconomic status (not very hard)	0.89 (0.74–1.09)	–	1.37** (1.13–1.67)	1.20 (0.97–1.48)
Perceived health status				
Excellent (ref)	–	–	–	–
Very Good	1.05 (0.69–1.62)	–	0.73 (0.47–1.16)	0.75 (0.47–1.19)
Good	1.19 (0.79–1.78)	–	0.44*** (0.29–0.68)	0.44*** (0.28–0.68)
Fair	1.12 (0.74–1.69)	–	0.37*** (0.24–0.58)	0.37*** (0.24–0.59)
Poor	0.95 (0.58–1.54)	–	0.29*** (0.17–0.49)	0.28*** (0.16–0.50)
Hierarchical Condition Category Community score	0.19*** (0.08–0.41)	0.18* (0.04–0.88)	2.25 (0.97–5.23)	–
Type of goal				
General healthcare management (ref)	–	–	–	–
Weight management/physical activity	–	–	0.68* (0.51–0.92)	0.66** (0.48–0.89)
Pain/musculoskeletal management	–	–	0.32*** (0.19–0.55)	0.31*** (0.18–0.53)
Smoking cessation	–	–	0.59* (0.37–0.93)	0.54* (0.34–0.88)
Diabetes management	–	–	1.18 (0.75–1.85)	1.15 (0.73–1.83)
Medication management	–	–	1.96* (1.08–3.56)	2.07* (1.13–3.79)
Used an app to achieve/work on health-related goals				
No (ref)	–	–	–	–
Yes	–	–	0.75** (0.61–0.91)	0.86 (0.59–1.24)
Talked with VA provider about goals				
No (ref)	–	–	–	–
Yes	3.46*** (2.87–4.16)	3.60*** (2.97–4.35)	1.14 (0.93–1.39)	1.25 (0.97–1.61)
Interaction of using app by talking with provider	–	–	–	0.76 (0.49–1.18)

*p < 0.05
**p < 0.01
***p < 0.001
Prior-Year Hierarchical Condition Category Community Score: Health scores calculated based on information in the VA Corporate Data Warehouse
Note: Adjusted model includes all variables significant in the unadjusted model

responsibility for and follow through with their health-related goals.

In our analysis, Veterans who were in worse overall health were less likely to set goals. We cannot assert any causal direction from this cross-sectional association, and these results could suggest that participants in poorer health were impeded (e.g., by their conditions) in setting health-related goals, or these participants were in poorer health because they did not set health-related goals. Future work might benefit from qualitative exploration of the goal-setting behaviors of those with multiple health issues to shed light on these questions.

In this analysis, Veterans who talked to their VA provider about goal setting were more likely to set health-related goals. While we cannot ascertain the directionality or temporal nature of this relationship (e.g., it may be that Veterans who had health-related goals were more likely to discuss those goals with their providers), these findings are encouraging and support the integration of goal-setting discussions into routine care, an effort that VA (and many other healthcare institutions) has already initiated. Interventions have mostly relied on collaborative goal setting, which might involve asking open-ended questions of the type noted above, wherein healthcare providers and patients come to a consensus on health topics to focus on, and together develop a specific goal and subsequent action plan.[18] Importantly, leveraging open-ended questions together with reflective listening is consistent with the principles of motivational interviewing, and as such, training providers in motivational interviewing may also further facilitate patients setting realistic and attainable health-related goals.

VA has been offering various supports for goal setting and achievement (e.g., personal health planning, health coaching,

Table 4 Characteristics Associated with Goal Achievement (*n*=1888) Among App Users and Non-Users: ORs and 95% CI levels

	App users (*n*=601)	App non-users (*n*=1287)
Characteristic		
Race		
White (ref)	–	–
Black	0.71 (0.44–1.14)	0.88 (0.61–1.27)
Other	1.32 (0.69–2.55)	1.07 (0.61–1.87)
Socioeconomic status (not very hard)	0.95 (0.65–1.39)	1.33* (1.03–1.71)
Perceived health status		
Excellent (ref)	–	–
Very good	0.85 (0.40–1.81)	0.70 (0.39–1.27)
Good	0.46* (0.22–0.94)	0.42** (0.24–0.74)
Fair	0.48 (0.23–1.02)	0.33*** (0.18–0.58)
Poor	0.26** (0.09–0.72)	0.29*** (0.14–0.57)
Type of goal		
General healthcare management (ref)	–	–
Weight management/physical activity	0.67 (0.38–1.18)	0.65* (0.45–0.93)
Pain/musculoskeletal management	0.41 (0.12–1.45)	0.28*** (0.15–0.53)
Smoking cessation	0.41 (0.07–2.28)	0.55* (0.33–0.92)
Diabetes management	1.03 (0.44–2.41)	1.23 (0.70–2.14)
Medication management	3.05 (0.83–11.25)	1.80 (0.90–3.59)
Talked with VA provider about goals		
No (ref)	–	–
Yes	0.95 (0.66–1.37)	1.25 (0.97–1.62)

*p < 0.05
**p < 0.01
***p < 0.001

the online patient portal's "My Goals" feature.[19] Collaborative care planning (i.e., shared decision-making [SDM]) is also being actively recommended within the context of VA care. Given that goal setting and SDM have been associated with positive patient outcomes, improved health behavior, and increased patient satisfaction,[20–22] our results suggest that VA should continue to integrate and normalize goal setting and SDM into clinical practice. This may be facilitated by offering providers training in how best to support patients in setting and working toward health-related goals, particularly those necessitating complex health behavior change such as weight management and smoking cessation.

Our results also suggested that patient use of mobile health apps as defined in our analysis was not associated with goal achievement. It is important to note, however, that this finding does not mean that app use does not support health goal achievement and should be interpreted in conjunction with a number of methodological considerations of our current work. For instance, the survey items that addressed this topic did not record the type of app used, the frequency of app use, or the drivers of that use. Furthermore, participants may have indicated that they used an app to pursue their goal, but we do not have data confirming that they used appropriate apps with corresponding goal-focused features or the extent to which (or context in which) they used these apps. Also, our survey asked if the participant used an app but did not clarify whether it was a VA-sponsored/endorsed app, which is often tailored to Veteran unique needs and experiences. Thus, it is unclear whether there are differences between VA-developed apps and all other available health-related apps.

The influence healthcare providers can have on patient willingness to adopt health-related apps is also important to recognize.[23] Increasing evidence indicates that when providers and patients engage together, as partners, in the management of a patient's health, technologies like apps are more likely to be used and in turn have their intended effect.[24] Unfortunately, we do not know whether the apps used by participants in this evaluation were designed to promote such engagement between providers and patients. Of note, VA is actively developing and releasing apps intended to be used by patients in partnership with their providers, and future work is needed to examine the differential adoption and impact of these specific apps.

Finally, it is also important to recognize that the majority of the literature on health-related goals is focused on specific and narrowly defined goal categories. Our current work, however, allowed participants to report on any health-related goal(s) they may have, and as such, included a wide range of goal categories. Because of this, we operationalized goal achievement dichotomously; however, goal achievement may best be modeled on a continuum to truly capture gradients of success. In addition, individuals may be more likely to achieve a smaller health-related goal (e.g., lose five pounds) than a larger goal (e.g., lose fifty pounds), and goals they set themselves (as opposed to goals their care providers may have set for them). Our analyses were not able to capture these nuances, each of which may impact the extent to which mobile health apps could support goal achievement and respondent perceptions of whether or not they achieved their goal at all. However, our inclusion of a broad range of health-related goals also comprises a unique and significant contribution to the health goal literature.

Limitations

Because our survey data were cross-sectional, we cannot infer causal associations. Additionally, our participants comprised a purposefully selected sample of Veterans who were users of VA's patient portal, whom research indicates are more educated, who are younger, and who have higher income than the overall Veteran population.[25,26] These Veterans may be a more "activated" and engaged group, and thus, the rate of discussing goals with providers and setting goals may be lower in the overall population, as compared to this sample. Although reflective of the overall Veteran population, our sample was comprised of more men than women, which may impact external validity of the results.

In addition, we measured both app use and goal achievement dichotomously; however, as we noted above, measuring these variables on a continuum may have provided additional insights into and context around the results. In particular, treating app use and goal achievement as continuous variables may have reduced the likelihood of type II errors, in the event these variables were related. Moreover, we did not take the inherent functionality of the apps used by participants into account, nor did we assess participant use of online/computer programs to support goal achievement. Future research that accounts for these details could offer additional insights to explain our findings.

CONCLUSIONS

We found male Veterans were less likely to set health-related goals, while individuals with advanced education demonstrated higher odds of setting goals. Individuals in worse health were less likely to set and achieve health-related goals. The strongest positive associations emerged between goal discussions with VA providers and goal setting. Future research and evaluation efforts should further explore the influence of patient-provider discussions on patient goal setting and achievement. Use of patient-facing technologies, specifically mobile health apps, may facilitate goal-oriented care, and further work is also needed to examine the potential benefits of health-related apps to support patients' health goals.

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Declaration:

Conflict of Interest: *The authors declare that they do not have a conflict of interest.*

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