# Leveraging SMS and Behavioral Theory to Improve Colorectal Cancer Screening in Federally Qualified Health Centers

*Tushar Talaparthy, Tonghui Xu PhD, Omolola Adepoju PhD, MPH*
**Tilman J. Fertitta Family College of Medicine**

Tilman J. Fertitta Family College of Medicine
UNIVERSITY OF HOUSTON

## BACKGROUND

Colorectal cancer (CRC) is the second leading cause of cancer-related death in the United States, with more than 152,000 new cases and 53,000 deaths projected in 2024. National guidelines recommend initiating screening at age 45, yet disparities remain. While overall CRC screening adherence among U.S. adults aged 50–75 is approximately 72%, patients receiving care at Federally Qualified Health Centers (FQHCs) experience much lower uptake, with average screening rates around 40%. These clinics disproportionately serve vulnerable populations with high rates of poverty, Medicaid coverage, and uninsurance, groups that also bear the heaviest burden of CRC morbidity and mortality.

Short message service (SMS) reminders are a promising tool to address preventive care gaps. Prior studies demonstrate improved appointment adherence, though evidence specific to CRC screening is mixed. Tailoring messages with behavioral theory principles may enhance their effectiveness. This study evaluates whether theory-informed SMS reminders improve CRC screening completion among overdue patients in two large FQHC systems.

## METHODS

➢ **Objective**: To determine the effectiveness of theory-informed SMS reminders on colorectal cancer screening completion in underserved populations receiving care at FQHCs.
➢ **Outcome:** Completion of FIT, colonoscopy, or Cologuard within 90 days of the intervention.
➢ **Analysis:** Multiple logistic regression adjusting for demographic, health, and geographic variables (age, sex, race/ethnicity, language, insurance, comorbidities, city/county factors).

## PARTICIPANTS
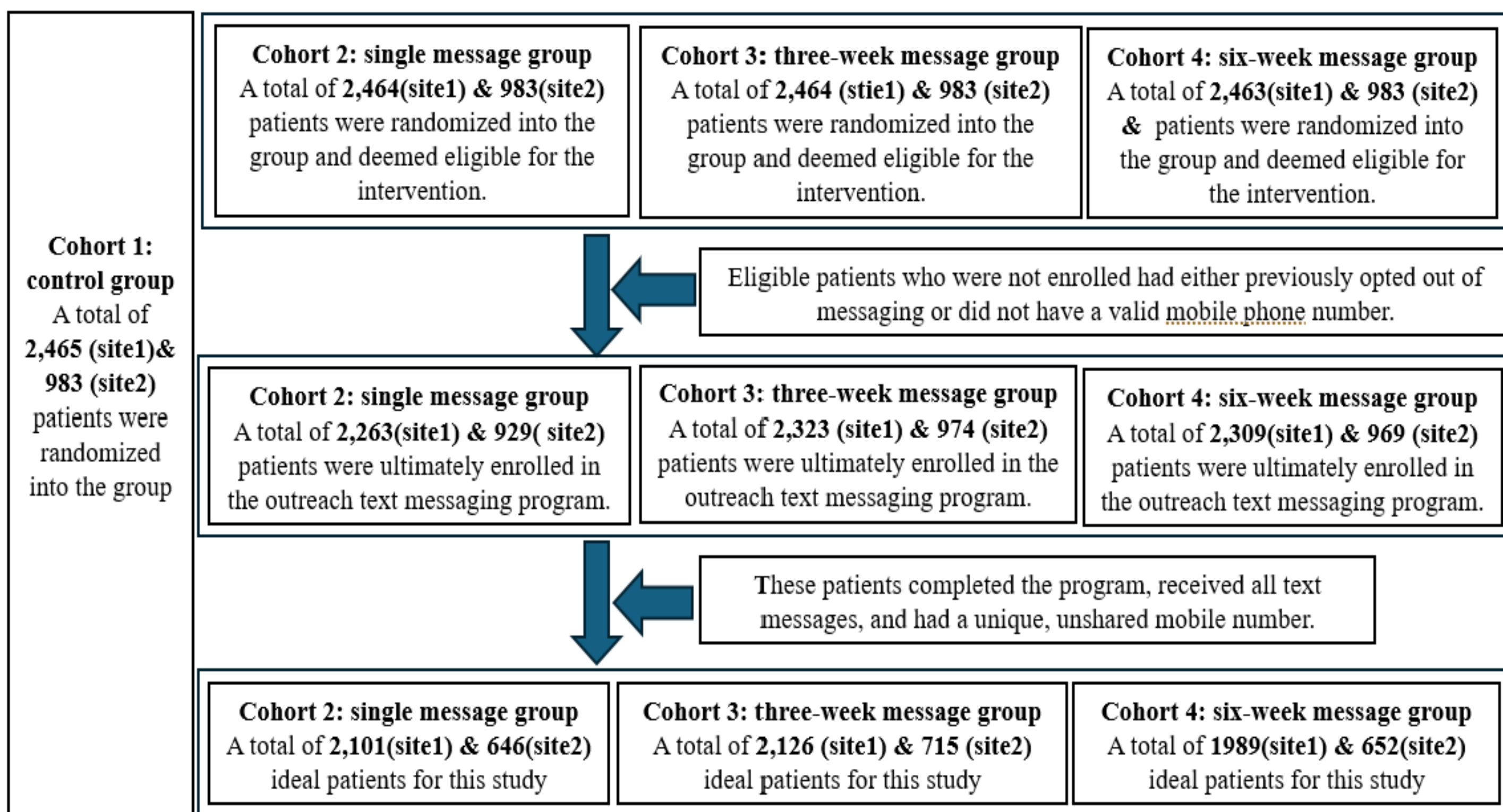


**Figure 1.** *Flowchart of the Colorectal Cancer Test Data Collection Process: (a) Cohort 1: Control Group, (b) Cohort 2: Single Message Group, (c) Cohort 3: 3-Week Message Group, and (d) Cohort 4: 6-Week Message Group.*

Adult patients aged 45 years and older from two large Federally Qualified Health Center (FQHC) systems in Texas and California were considered eligible if they were active within the prior 12 months, overdue for colorectal cancer screening, and had a valid, unique mobile phone number. Patients who had opted out of messaging or shared a phone number were excluded.
The final analytic sample included 4,822 participants: 1,143 in the control group, 1,193 in the single message group, 1,265 in the three-week message group, and 1,221 in the six-week message group. The population was predominantly Hispanic (58%), female (59%), and middle-aged (53% aged 45–59), with most participants uninsured or on public insurance.

## INTERVENTION

Participants were randomized into four arms:
1. **Control:** No SMS outreach.
2. **Single SMS:** One-time overdue reminder.
3. **Three-week SMS:** One message weekly for three weeks.
4. **Six-week SMS:** Behavior theory–informed, interactive messages three times weekly for six weeks (18 total).

Interactive messages allowed patients to reply, request more information, or opt out. The six-week series incorporated the Theory of Behavior Change to address motivation, barriers, and readiness. Message delivery and patient engagement were logged, with only patients who completed the assigned program included in analyses.

## RESULTS

The analytic sample included 4,822 participants: 1,143 control, 1,193 single SMS, 1,265 three-week SMS, and 1,221 six-week SMS.
CRC screening completion rates were 24% in the control group, 27% in the single message group, 28% in the three-week message group, and 27% in the six-week message group. Only the three-week reminder cohort demonstrated a significant increase in completion compared to control (OR=1.27, p=0.02). Response rates to SMS were highest in the three-week cohort (35%) compared to 21% in the six-week cohort.
Across test types, patients scheduled for colonoscopy or Cologuard had over twelve times higher odds of completion compared to those offered FIT, despite FIT being distributed most frequently. Screening adherence declined with advancing age: patients 60–64, 65–69, and ≥70 were significantly less likely to complete testing compared to those aged 45–59.
Spanish-speaking and other non-English speaking patients were more likely to complete screening than English speakers. Insurance status revealed a unique pattern, with uninsured patients more likely to complete screening than those with Medicaid. Patients with obesity demonstrated higher adherence, while those with heart disease were less likely to complete testing. Residence in California was associated with significantly higher completion than Texas, consistent with Medicaid expansion policy differences.

**Table 1.** Study cohort by colorectal cancer gap closure rate

| | Cohort 1 n=1,143 | Cohort 2 n=1,193 | Cohort 3 n=1,265 | Cohort 4 n=1,221 |
|---|---|---|---|---|
| **Colorectal cancer screening completed within 90 days of end of intervention** | 275 (24%) | 328 (27%) | 355 (28%) | 326 (27%) |
| **Response rate of intervention** | N/A | N/A | 438 (35%) | 258 (21%) |

*Note. Cohort 1 did not receive any messages, while Cohort 2 only received a single message and was not asked to respond.*

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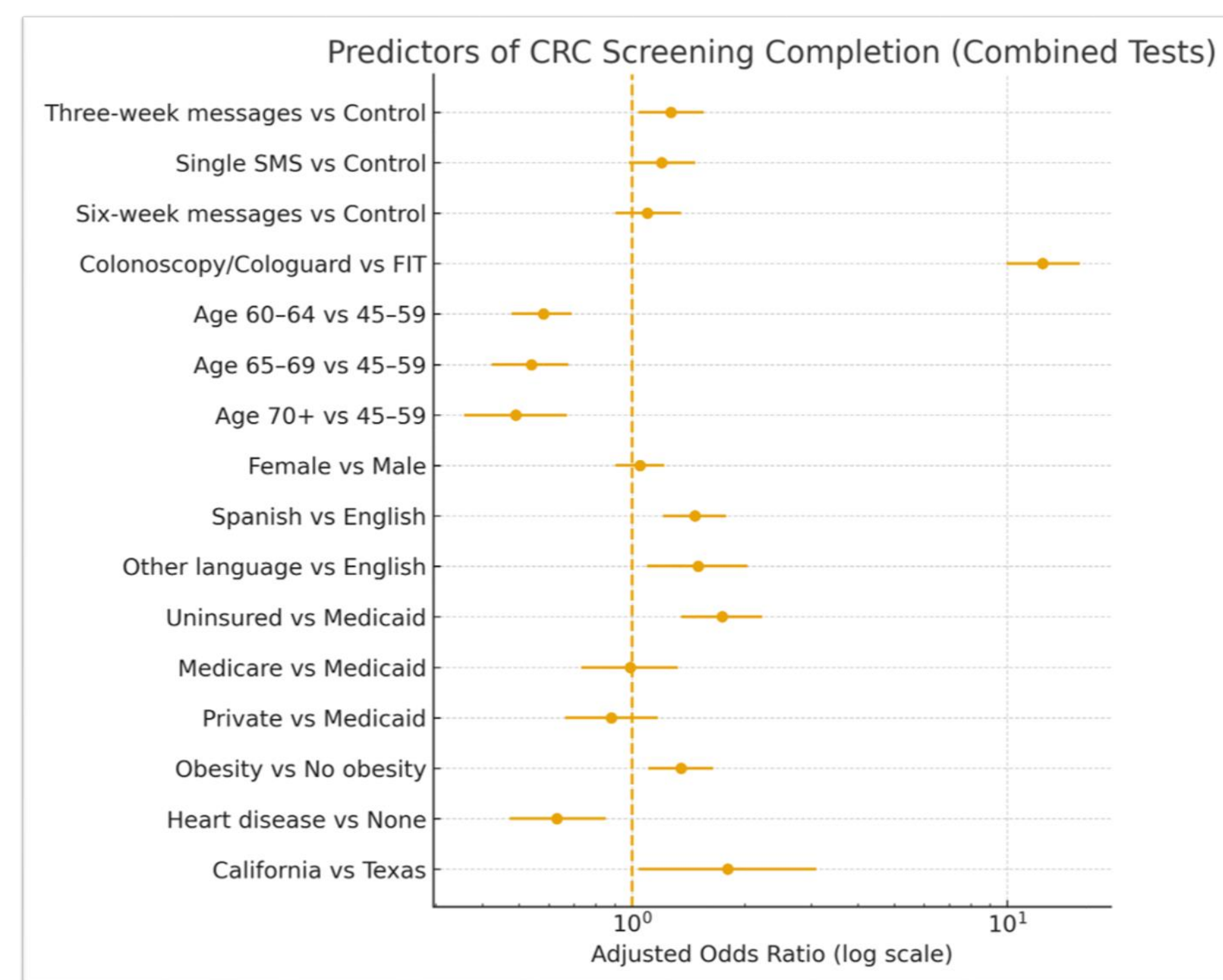


**Figure 2.** "Adjusted odds ratios (95% CI) for colorectal cancer screening completion within 90 days. Reference groups: control (study cohort), FIT (test type), age 45–59, male, English, Medicaid, no obesity, no heart disease, Texas.

## DISCUSSION

Theory-informed SMS reminders were most effective when delivered weekly for three weeks, while single or prolonged six-week series did not improve screening, underscoring the importance of timing and frequency. Colonoscopy and Cologuard showed markedly higher completion than FIT, reflecting challenges with sustaining adherence to annual stool-based testing despite broader distribution.
Spanish-speaking and other non-English patients had higher completion rates, likely reflecting the culturally tailored, language-concordant care provided at FQHCs. Uninsured patients also showed higher uptake than those with Medicaid, possibly due to free FIT kits with postage-paid return envelopes.
Obesity was associated with greater completion, while heart disease reduced it, reflecting competing demands of chronic disease management over preventive care. Screening was more frequent in California than Texas, highlighting the role of Medicaid expansion and state-level policy differences in shaping access.

## REFERENCES

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