

Using a Stage-Based Intervention to Increase Colorectal Cancer Screening Among Rural Adults

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Introduction

Colorectal cancer (CRC) remains a major cause of cancer illness and death in the United States, even though screening can prevent many cases through the detection and removal of precancerous polyps. Screening can also identify cancer at an earlier and more treatable stage. Recent national patterns are especially concerning because incidence has increased among adults younger than age 55, while unequal access to prevention continues to affect rural and medically underserved communities (Siegel et al., 2023). The recommendation to begin routine screening at age 45 creates an important opportunity to reach adults earlier, but a recommendation alone does not ensure that screening is completed.

Rural adults experience a combination of behavioral and structural barriers. Some know screening is recommended but do not feel personally at risk, particularly when they feel healthy or have no symptoms. Others fear the procedure, feel embarrassed, misunderstand available testing options, or receive inconsistent recommendations. Transportation difficulties, long travel distances, limited specialty care, cost, work schedules, caregiving responsibilities, and delays between referral and colonoscopy compound these concerns. Lee et al. (2023) found that distance and transportation remain meaningful obstacles in rural communities, even when long travel is accepted as a routine part of obtaining care. These barriers rarely occur one at a time, which makes education-only interventions unlikely to be sufficient.

Rural communities also cannot be treated as one uniform population. Communities only a few miles apart may differ in culture, resources, trusted organizations, transportation patterns, and relationships with health systems. Effective interventions need a consistent, evidence-based core while allowing community partners to adapt delivery without weakening the intervention. That balance is essential to cultural responsiveness, feasibility, and long-term sustainability. The purpose of this review is to evaluate the theories, design features, cultural responsiveness, and behavior change strategies used in interventions intended to increase CRC screening among rural and underserved adults ages 45 to 75. Based on the strongest findings, this paper proposes a Precaution Adoption Process Model (PAPM)-guided intervention that combines stage-matched education, direct access to fecal immunochemical testing (FIT), patient navigation, tailored reminders, and closed-loop follow-up to address both decision-making and structural barriers.

Literature Search and Selection Methods

A structured literature search was conducted using PubMed/MEDLINE, CINAHL Complete, APA PsycInfo, and Scopus. The University of Arizona Global Campus OneSearch system was used to locate full-text articles when needed. Search terms were used individually and in combination, including colorectal cancer, screening, colonoscopy, fecal immunochemical test, FIT, fecal occult blood test, FOBT, rural, nonmetropolitan, Appalachia, intervention, outreach, navigation, reminder, education, and mailed FIT. General internet search engines and nonacademic databases were avoided as primary evidence sources because the review required peer-reviewed intervention research.

Studies were included when they examined U.S. adults ages 45 to 75, or a substantially overlapping screening-eligible age range; included rural, low-income, medically underserved, or otherwise relevant populations; evaluated an intervention intended to increase CRC screening; used a controlled, randomized, quasi-experimental, pretest-posttest, systematic review, meta-analysis, or scoping review design; and reported a quantitative screening outcome or evidence directly informing intervention design. Studies were excluded if they focused only on urban or non-U.S. populations, cancer treatment or surveillance, hereditary CRC syndromes, people with a prior CRC diagnosis, descriptive or qualitative evidence irrelevant to implementation, or intention without a screening-completion outcome. Qualitative rural-barrier evidence was retained only as supporting context for the proposed intervention, not as proof of intervention effectiveness.

Information extracted from each selected source included study design, participant characteristics, intervention format and dosage, theoretical framework, facilitators, cultural adaptation, attrition, outcome measures, behavioral results, and limitations. The core evidence included one cross-sectional stage analysis, one rural scoping review, and one national systematic review and meta-analysis. These designs were not sufficiently comparable for an additional pooled analysis, so results were synthesized narratively. Additional peer-reviewed studies were used to strengthen the epidemiological, cultural, and implementation rationale.

Review of the Literature

Methods and Characteristics of the Evidence

Hester et al. (2015) analyzed baseline data from 470 racially and ethnically diverse, low-income adults eligible for CRC screening. The investigators applied PAPM staging separately to stool blood testing and colonoscopy. This distinction was important because readiness was not consistent across screening modalities: a person could be prepared to complete a stool-based test while remaining undecided about colonoscopy. The study evaluated associations among decisional stage, physician recommendation, self-efficacy, language, education, demographic characteristics, and screening status. Its cross-

sectional design supported identification of stage-related factors but could not establish that stage-matched intervention components caused screening completion.

Kava et al. (2025) completed a scoping review of 36 publications describing interventions conducted in primarily rural U.S. settings from January 2010 through May 2024. The authors searched CINAHL, Embase, MEDLINE, and Scopus and categorized intervention components according to Community Preventive Services Task Force strategies. Thirty-four studies used multicomponent interventions, and 21 reported using a theory, framework, or research approach. Because the review did not assess study quality or risk of bias and did not pool effects, it was most useful for identifying common program features, implementation gaps, and geographic limitations rather than estimating one overall effect.

Dougherty et al. (2018) conducted a systematic review and meta-analysis of 73 U.S. randomized clinical trials involving 366,766 participants at low or medium risk of bias. Investigators independently extracted data, appraised risk of bias, and used random-effects meta-analysis when studies were sufficiently similar. Strategies included fecal blood test outreach, patient navigation, reminders, education, decision support, clinician-focused approaches, and multicomponent interventions. The primary outcome was screening completion, with separate attention to initial screening, colonoscopy after an abnormal test, and repeat annual fecal testing. Variation in populations, follow-up periods, and intervention designs created substantial heterogeneity, but the direction of effects for the strongest strategies was consistently positive.

Table 1

Key Characteristics of Reviewed Studies

Characteristic	Hester et al. (2015)	Kava et al. (2025)	Dougherty et al. (2018)
Program	Decisional Stage Distribution	Rural CRC Screening Scoping Review	U.S. CRC Intervention Review
Population	470 low-income, racially and ethnically diverse screening-eligible adults	Adults represented in 36 publications from primarily rural U.S. settings, 2010–2024	366,766 adults in 73 U.S. randomized clinical trials
Research design	Cross-sectional baseline analysis	Scoping review	Systematic review and random-effects meta-analysis
Theory	PAPM	Varied; 21 studies reported a theory, framework, or research approach	Varied or unreported

Characteristic	Hester et al. (2015)	Kava et al. (2025)	Dougherty et al. (2018)
Attrition	Not reported for baseline analysis	Not applicable at review level; varied by study	Not applicable at review level; varied by trial
Outcome measures	Stage for stool testing and colonoscopy; provider recommendation; self-efficacy	Screening uptake; intervention components; implementation features	Initial screening completion, follow-up colonoscopy, and repeat fecal testing
Behavioral results	No intervention effect tested. Recommendation and self-efficacy were associated with later stages; readiness differed by modality.	Most multicomponent studies increased uptake; reminders, small media, and structural-barrier reduction were most common.	Fecal-test outreach: RD 22%; navigation: RD 18%; combined approaches added RD 7%.
Limitations	Cross-sectional; one intervention sample; completion and causality not established.	No quality appraisal or pooled effect; heterogeneous rural definitions; limited geographic coverage and cost reporting.	Heterogeneity; limited evidence for abnormal-test follow-up, repeat screening, and cost-effectiveness.

Note. CRC = colorectal cancer; PAPM = Precaution Adoption Process Model; RD = risk difference.

Results

Across the reviewed evidence, information alone was insufficient to ensure consistent screening completion. Hester et al. (2015) showed that physician recommendation, self-efficacy, and screening modality were related to PAPM stage. This supports asking about readiness for specific options instead of classifying a person as generally willing or unwilling to screen. It also explains why a standard message may fail: adults who are unaware, unengaged, undecided, or ready to act need different information and support.

The intervention reviews consistently favored active outreach over passive education. In the meta-analysis by Dougherty et al. (2018), fecal blood test outreach produced a pooled 22-percentage-point increase in completion compared with usual care, and patient navigation produced an 18-percentage-point increase. Patient education and reminders produced smaller risk differences of 4% and 3%, respectively. Adding navigation or clinician interventions to fecal-test outreach improved completion by an additional 7 percentage points over a single intervention. These findings show that education and reminders can contribute to change but are more effective when connected to direct test access and individualized barrier reduction.

The rural evidence was consistent with that pattern. Kava et al. (2025) found that 34 of 36 studies used multicomponent interventions and that most studies increased screening uptake. The most common components were client reminders and small media, each used

in 25 studies, and reduction of structural barriers, used in 24. However, rural representation was limited to 19 states, only nine studies defined rurality, and six included cost analyses. These limitations matter because results from one rural region may not translate directly to another without attention to local transportation, health-system capacity, communication preferences, and community trust.

Davis et al. (2019) used microsimulation to compare approaches for Medicaid enrollees and estimated that mailed FIT plus navigation would increase screening by 11.6 percentage points after one year, compared with 2.5 percentage points for reminders alone. Briant et al. (2018) paired culturally tailored, promotor-led education with free stool-based testing in a rural Hispanic community and reported a 28% increase in screening. Together, these studies reinforce a practical conclusion: education is strongest when a trusted person delivers it, the participant can act immediately, and assistance continues through barriers and follow-up.

Table 2

Program Characteristics and Behavior Change Strategies

Study	Duration, intensity, and format	Facilitators and content	Cultural responsiveness	Strategies/ behavior change techniques
Hester et al. (2015)	Single baseline, in-person assessment; parent intervention dosage not evaluated	Research staff; separate PAMP staging for stool testing and colonoscopy	English- and Spanish-speaking, racially and ethnically diverse low-income participants	Stage assessment; tailoring by readiness and modality; identification of self-efficacy and recommendation factors
Kava et al. (2025)	Varied clinic, mail, telephone, community, and mixed formats; usually multiple contacts	Clinic teams, navigators, and community health workers; reminders, education, FIT, navigation, and outreach	Several studies focused on underserved racial or ethnic groups; adaptation reporting was inconsistent	Client reminders; small media; one-to-one education; direct testing; structural-barrier reduction; provider strategies
Dougherty et al. (2018)	Varied across 73 trials; follow-up generally assessed completion over several months	Navigators, clinicians, outreach staff, and automated systems; fecal-test outreach, education, reminders, and decision support	Some language- or population-tailored materials; cultural adaptation was inconsistently described	Direct test access; navigation; prompts and reminders; patient/provider activation; multicomponent delivery

Note. FIT = fecal immunochemical test; PAMP = Precaution Adoption Process Model.

Discussion and Implications

The clearest effective characteristics were direct test access, tailored and repeated contact, navigation by a trusted worker, and coordinated follow-up. Less effective approaches relied on awareness alone, used the same message regardless of readiness, or left participants to resolve transportation, scheduling, and referral barriers. This pattern supports addressing both personal determinants and the conditions that make screening possible (DiClemente et al., 2019). Cultural competency also extends beyond translation. Responsive programs use trusted messengers, plain language, relevant examples, respect for privacy and fear, and delivery sites that fit everyday life. Briant et al. (2018) showed how cultural connection and free test access can work together, although many studies did not report community involvement or track adaptations.

Future research should measure repeat annual FIT adherence, timely colonoscopy after abnormal results, cost, subgroup reach, fidelity, and sustainability—not only one-time completion. Rural studies also need clearer definitions of rurality and stronger reporting of local context. Preserving an intervention’s theoretical function while adapting language, messengers, schedules, and locations offers a practical balance between fidelity and community fit.

Novel Intervention Description With Logic Model

Rationale and Priority Population

Rural Steps to Screening is designed for rural adults ages 45 to 75 who are not up to date with CRC screening. Initial outreach emphasizes PAPM Stage 2 adults, who know screening exists but have not connected it to their own health, while maintaining pathways for people in every stage. Delivery can occur through clinics, libraries, senior centers, housing communities, employers, pharmacies, and civic organizations so people are reached in trusted settings. Local partners may adapt examples, wording, images, schedules, messengers, and communication channels, while stage matching, FIT safety procedures, navigation, reminders, data definitions, and abnormal-result follow-up remain consistent.

Theory, Constructs, and Behavior Change Techniques

PAPM organizes screening as a sequence rather than a yes-or-no decision (Weinstein, 1988). Stage 1 participants are unaware of the issue; Stage 2 participants are aware but unengaged; Stage 3 participants are deciding; Stage 4 participants have decided not to act; Stage 5 participants have decided to act; Stage 6 participants have acted; and Stage 7 participants maintain the behavior. The intervention targets personal relevance, perceived susceptibility, knowledge, decisional balance, self-efficacy, action planning, and maintenance. Health Belief Model concepts are incorporated within the stage-based approach through attention to susceptibility, benefits, barriers, cues to action, and confidence (DiClemente et al., 2019).

A two- to four-question assessment identifies the participant's stage and preferred option. Unaware participants receive a brief introduction; unengaged participants receive information that makes screening personally relevant; undecided participants receive balanced information about options and barriers; and those who decline are treated respectfully. Adults ready to act receive an immediate referral or ordered FIT kit, an action plan, navigation, and reminders. Techniques include tailoring, credible-source communication, problem-solving, goal-setting, action planning, prompts, direct test access, social support, teach-back, and feedback.

Table 1

Rural Steps to Screening Logic Model

Inputs	Activities	Outputs	Short-term outcomes	Intermediate outcomes	Long-term outcomes
Clinic and community partners; trained navigators; FIT supply and lab capacity; multilingual materials; referral agreements; tracking system	Stage assessment; tailored education; FIT distribution or referral; barrier screening; reminders; navigation; closed-loop abnormal-result follow-up	Adults reached and staged; educational contacts; FIT kits ordered, distributed, and returned; reminders; navigation contacts; referrals completed	Greater personal relevance, knowledge, trust, self-efficacy, and intention; movement from PAMP Stages 1–3 toward Stage 5	More screening within 90 days; timely colonoscopy after abnormal FIT; reduced gaps across groups; repeat-screening plans	Sustained guideline-concordant screening; earlier detection and prevention; reduced rural CRC disparities and mortality

Note. FIT = fecal immunochemical test; PAMP = Precaution Adoption Process Model.

Intervention Components, Implementation, and Dissemination

A trained navigator or community health worker will deliver a 10- to 20-minute encounter that includes stage and barrier assessment, matched education, and selection of a next step. Eligible adults may receive or be mailed a FIT kit with plain-language instructions and choose text, telephone, email, or mailed reminders. Navigators will address unreturned kits, transportation, scheduling, and abnormal-result follow-up. Implementation will begin with one clinical partner and two or three community sites. Training will cover PAMP staging, teach-back, trauma-informed communication, confidentiality, FIT workflow, referrals, and documentation. A shared protocol and monthly learning meetings will track responsibilities, missed handoffs, returns, referrals, and participant feedback. After a three-month pilot, partners can disseminate the program through a concise implementation guide, training slides, adaptable outreach materials, and workflow diagrams.

Key Considerations for Effective Implementation

Five considerations will guide implementation. First, fidelity will be protected through training, competency checks, a standard stage assessment, required messages, a defined referral workflow, and monthly review. Second, adaptations will be logged: wording, images, settings, schedules, and messengers may change, while stage matching, direct action access, navigation, and closed-loop follow-up remain intact. Third, a local advisory group will review language, privacy concerns, cultural considerations, and outreach channels; materials will use plain language, preferred languages, teach-back, and respect for informed refusal. Fourth, FIT supply, laboratory processing, clinical orders, colonoscopy access, transportation, insurance support, and responsibility for abnormal results will be confirmed before outreach. Fifth, equity and sustainability will be monitored through reach, kit return, navigation, screening within 90 days, diagnostic colonoscopy within six months, program cost, and repeat-screening plans, with results compared across geographic and demographic groups.

Conclusion

CRC screening disparities in rural communities stem from more than a lack of information. Readiness, perceived risk, confidence, provider recommendation, trust, transportation, cost, local capacity, and the screening pathway all affect completion. The evidence supports direct access to fecal tests, navigation, reminders, trusted messengers, and multicomponent programs, while PAPM explains why the same message will not work for every person or screening method. Rural Steps to Screening combines these lessons in an intervention that is consistent enough to evaluate and adaptable to each community. Its stage-matched education, immediate action pathway, and closed-loop follow-up can help rural adults complete preventive screening.

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