# Client-Directed Interventions to Increase Community Demand for Breast, Cervical, and Colorectal Cancer Screening

## A Systematic Review

Roy C. Baron, MD, MPH, Barbara K. Rimer, DrPH, Rosalind A. Breslow, PhD, Ralph J. Coates, PhD, Jon Kerner, PhD, Stephanie Melillo, MPH, Nancy Habarta, MPH, Geetika P. Kalra, MPH, Sajal Chattopadhyay, PhD, MPH, Katherine M. Wilson, PhD, Nancy C. Lee, MD, Patricia Dolan Mullen, DrPH, Steven S. Coughlin, PhD, MPH, Peter A. Briss, MD, and the Task Force on Community Preventive Services

**Abstract:** Most major medical organizations recommend routine screening for breast, cervical, and colorectal cancers. Screening can lead to early detection of these cancers, resulting in reduced mortality. Yet not all people who should be screened are screened, either regularly or, in some cases, ever. This report presents the results of systematic reviews of effectiveness, applicability, economic efficiency, barriers to implementation, and other harms or benefits of interventions designed to increase screening for breast, cervical, and colorectal cancers by increasing community demand for these services. Evidence from these reviews indicates that screening for breast cancer (mammography) and cervical cancer (Pap test) has been effectively increased by use of client reminders, small media, and one-on-one education. Screening for colorectal cancer by fecal occult blood test has been increased effectively by use of client reminders and small media. Additional research is needed to determine whether client incentives, group education, and mass media are effective in increasing use of any of the three screening tests; whether one-on-one education increases screening for colorectal cancer; and whether any demand-enhancing interventions are effective in increasing the use of other colorectal cancer screening procedures (i.e., flexible sigmoidoscopy, colonoscopy, double contrast barium enema). Specific areas for further research are also suggested in this report.
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## Introduction

Cancer is a major public health problem in the U.S. In 2003, more than 1,290,000 people were diagnosed with cancer and more than 556,000 died of cancer.[1,a] This included more than 55,000 men and women who died from colorectal cancer, 41,000 women from breast cancer, and nearly 4000 women from cervical cancer. According to a 2003 report from the Institute of Medicine's National Cancer Policy Board,[2] each year 4475 deaths from breast cancer, 3644 deaths from cervical cancer, and 9632 deaths from colorectal cancer could be prevented if all eligible Americans received appropriate cancer screening services. Yet the 2005 National Health Interview Survey of U.S. adults[3] found that only 67% of women aged ≥40 years reported having had mammograms within the previous 2 years, and 78% of women aged ≥18 years reported Pap tests within the previous 3 years. Among adults aged ≥50, only 50% reported ever having screening endoscopies and only 17% reported having fecal occult blood tests (FOBT) within the previous 2 years. Lower rates were observed among American Indians and Alaska Natives; people of Asian, Latino, or Hispanic ethnicity; African Americans (endoscopy, only); and among poor and less-educated populations. Rates for recommended screenings tend to be lower among individuals without a usual source of health care, without health insurance, and among recent immigrants to the U.S.[4] At the same time, efforts to maxi-

From the Community Guide Branch, National Center for Health Marketing (Baron, Melillo, Habarta, Kalra, Chattopadhyay, Briss) and Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion (Breslow, Coates, Wilson, Lee, Coughlin), CDC, Atlanta, Georgia; University of North Carolina School of Public Health (Rimer), Chapel Hill, North Carolina; National Cancer Institute, National Institutes of Health (Kerner), Bethesda, Maryland; and University of Texas School of Public Health (Mullen), Houston, Texas.

Author affiliations are shown at the time the research was conducted.

The names and affiliations of the Task Force members are listed at the front of this supplement and at www.thecommunityguide.org.

Address correspondence to Roy C. Baron, MD, MPH, Community Guide Branch, CDC, 1600 Clifton Road NE, MS E-69, Atlanta GA 30333. E-mail: rbaron@cdc.gov.

Address reprint requests to Shawna L. Mercer, MSc, PhD, The Guide to Community Preventive Services, CDC, 1600 Clifton Road NE, MS E-69, Atlanta GA 30333. E-mail: SMercer@cdc.gov.

[a]Numbers of cancer diagnoses are based on the most current reports of observed cases from cancer registries in CDC's National Program of Cancer Registries and NCI's Surveillance, Epidemiology, and End Results Program. Numbers of deaths are from CDC's National Vital Statistics Program.


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mize control of breast, cervical, and colorectal cancers through screening face the additional challenge of assuring that cancer screening, once initiated, is repeated at recommended intervals.[5,6] Increasing use of these screening tests at recommended intervals and reducing inequalities in screening use are important steps toward reducing cancer morbidity and mortality.[2]

An array of community- and systems-based interventions are available to programs and planners for use in promoting cancer screening.[7,8] These interventions can target clients (client-directed), providers (provider-directed), or both, each either directly or through the healthcare system. Many of these interventions also have been applied in other areas of public health, but their effectiveness, applicability, and cost effectiveness in increasing cancer screening rates are either not clearly established or not completely understood.

The *Guide to Community Preventive Services (Community Guide),* developed by the independent, nonfederal Task Force on Community Preventive Services (Task Force), has conducted systematic reviews on the effectiveness, applicability, economic efficiency, barriers to implementation, and other harms or benefits of community interventions to increase screening for breast, cervical, and colorectal cancers.[7] The conceptual approach to and selection of interventions for these reviews focused on three primary strategies to close screening-related gaps: increasing community demand for cancer screening services, reducing barriers to access, and increasing delivery of these services by healthcare providers. The first two strategies encompass client-directed approaches intended to influence client knowledge, motivation, access, and decision to be screened at appropriate intervals. The third strategy encompasses provider-directed approaches to reduce missed opportunities to recommend, order, or deliver cancer screening services at appropriate intervals. Evidence from these reviews provides the basis for Task Force recommendation of interventions in each of these strategic areas as well as for identifying additional research needs.

In this report, evidence is reviewed on the effectiveness of classes of client-directed interventions intended to increase community demand for screening recommended for early detection of breast cancer (mammography), cervical cancer (Pap test), and colorectal cancer (guaiac-based FOBT, flexible sigmoidoscopy, colonoscopy, or double contrast barium enema).[9–12] Client-directed interventions designed to increase community access to these services are reviewed in an accompanying article,[13] as are two types of provider-directed interventions.[14] An additional provider-directed intervention and multicomponent (combinations of) interventions will be reviewed in future publications.

The use of *community* will usually refer to a group of individuals who share one or more characteristics,[15] in this case the potential to benefit from one or more cancer screening services. *Community* is also used in reference to a setting or in combination with "community healthcare worker," in which case the intent is locale, neighborhood, or other geopolitical unit.

## Methods

General methods for conducting *Community Guide* systematic reviews have been described in detail.[16,17] Specific methods for conducting reviews of interventions to increase breast, cervical, and colorectal cancer screening are described elsewhere in this supplement.[8] That description includes the overall literature search of primary scientific publications through November 2004, selection of the 244 candidate studies satisfying general inclusion criteria for the cancer screening reviews, and specific criteria applied to the final selection of qualifying studies for each review (suitability of study design and quality of execution[16]; see Results sections). In this section, methodologic issues are briefly discussed, specific to classes of interventions covered in this article, that is, those designed to increase community demand—client reminders or recall, client incentives, small media, mass media, group education, and one-on-one education—and for which 128 of the 244 candidate studies were considered for review. A summary of the results and other details of the final qualifying studies for each intervention review are available at www.thecommunityguide.org/cancer.

The analytic model (Figure 1), similar to other constructs used in *Community Guide* cancer screening intervention reviews,[7,8,13,14] shows hypothesized relationships between interventions to increase community demand, a series of intermediate steps, and ultimate (desired) health outcomes. Completed screening (shaded) is the outcome of primary interest in these reviews. Although completed screening is an intermediate step in the model, it provides the basis for evaluation of intervention effectiveness because of established links to the health outcome of ultimate interest: decreased mortality from breast, cervical, and colorectal cancers.[9–12] Interventions to increase community demand are directed toward age-eligible populations with the goal of increasing adherence to screening recommendations. The systematic review development team (the team)[7] postulated that by positively influencing some combination of knowledge, awareness, and intent (the last of which may require altering attitudes and beliefs about screening services and tests), each intervention has the potential to increase demand for screening. These changes, in turn, would lead to increased test completion and early detection and, ultimately, reduce cancer morbidity and mortality. The interventions might also cue or prompt clients who are ready for screening. The model also indicates that these interventions may result in other benefits and harms, such as positive or negative effects on other health behaviors or use of healthcare services.

Although several recommended screening procedures are also used for diagnostic or therapeutic purposes (i.e., mammography, colorectal endoscopy, and double contrast barium enema), reference to them in these reviews relates specifically to the screening application.

Intervention effectiveness was evaluated by comparing pre- and post-intervention screening practices in the study groups with those in groups receiving no intervention. For each study, the measure of effect was represented, where possible, as per-

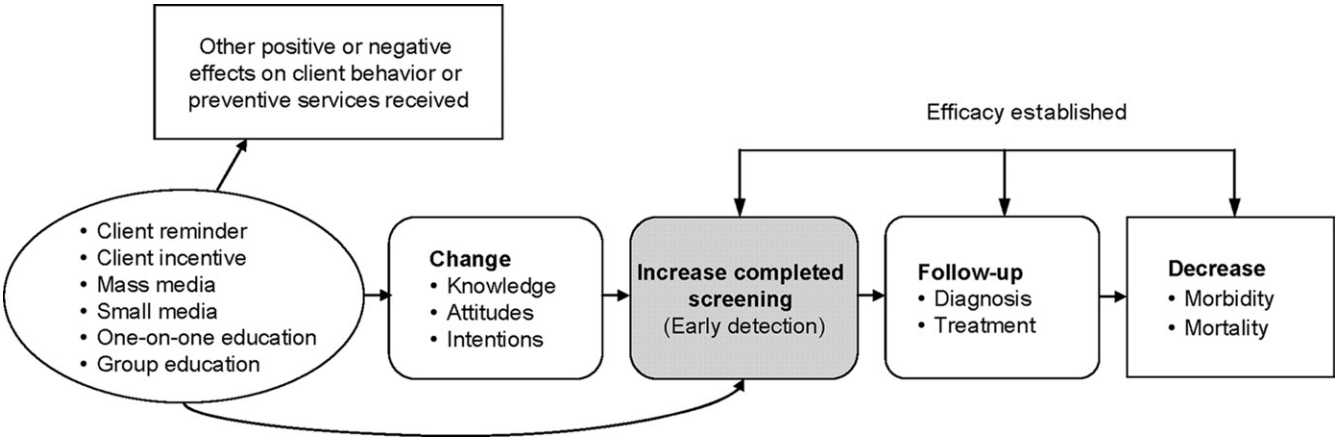



**Figure 1.** Analytic framework: interventions to increase community demand for cancer screening services. (Oval indicates interventions; rectangles with rounded corners indicate mediators or intermediate outcomes, and rectangle indicates health outcomes.)

centage point (i.e., absolute) change in completed screening from baseline or comparison value. When an effect was reported as an odds ratio (OR) or percent (i.e., relative) change and could not be converted to percentage point change, it was generally excluded from the summary effect measure. These results were reported separately, however, to reflect the complete evidence base and to assess consistency across all studies.

In general, to answer questions about whether particular interventions are effective, *Community Guide* systematic reviews consider data from all available studies of sufficient quality that compare outcomes in a group exposed to an intervention with outcomes in a group either concurrently or historically unexposed (or less exposed) to the intervention.[16,17] Consistent with many groups that focus on population-based or public health interventions,[18] this approach is broadly inclusive of a range of study designs. (For the review of client reminders, however, a large number of studies had designs of greatest suitability [i.e., those with pre- and post-intervention assessments and comparison groups]. The review of that intervention was therefore limited to studies of greatest design suitability; our conclusion was that exclusion of other levels of design suitability did not compromise external validity.)

As noted elsewhere in this supplement,[7,8] client-related barriers can differ by screening test and by population subgroup. Therefore, effectiveness, applicability, and economic efficiency of client-directed interventions were reviewed separately for breast, cervical, and colorectal cancers. Also considered were other positive or negative effects, barriers to implementation, and areas needing further research.

## Results: Client Reminders

Client reminder or recall (referred to collectively as client reminders) included in this review are printed (letter or postcard) or telephone messages advising people that they are due (reminder) or late (recall) for screening. Client reminders, as defined by our team, may be enhanced by one or more of the following: a follow-up printed or telephone reminder; additional text or discussion with information about indications for, benefits of, and ways to overcome barriers to screening; or assistance in scheduling appointments. Tailored reminders (printed or verbal) address the individual's risk profile or other relevant psychological or social characteristics, such as what keeps a specific client from seeking screening and what would encourage the client to be screened. The effectiveness of client reminders for improving adherence to several other preventive interventions is well documented.[19–23]

### Breast Cancer

**Effectiveness.** Thirty-nine studies[24–62] of greatest design suitability were identified that reported using client reminders to increase breast cancer screening by mammography. Of these, nine studies[24–32] were excluded due to limited quality of execution[8] and 11[33–43] were excluded because comparison groups received different reminders or reminders of lesser intensity than study groups. Of the 19 remaining studies that qualified for review, 17[44–50,52–60,62] had fair quality of execution and two[51,61] had good quality of execution.

All studies enrolled eligible women who were due or overdue for mammography and assessed screening completion using self-reports[57,60] or record reviews.[44–56,58,59,61,62] The 19 qualifying studies evaluated 32 intervention arms. Three studies[56,57,61] evaluated three interventions, four studies[44,45,53,58] evaluated two interventions (one[58] study evaluated each intervention at two separate screening locations), and 12 studies[46–52,54,55,59,60,62] evaluated one intervention (one study[46] evaluated the intervention at two distinct locations).

Printed reminders were either used alone[44–46,48,49,53–58,60,62] or enhanced by one or more of the following elements: face-to-face counseling, scheduling assistance or direct referral, follow-up telephone reminder (with or without scheduling assistance or an educational component), or a follow-up letter offering scheduling assistance.[45,50–53,57–59,62] Telephone reminders were either used alone,[56] with scheduling assistance

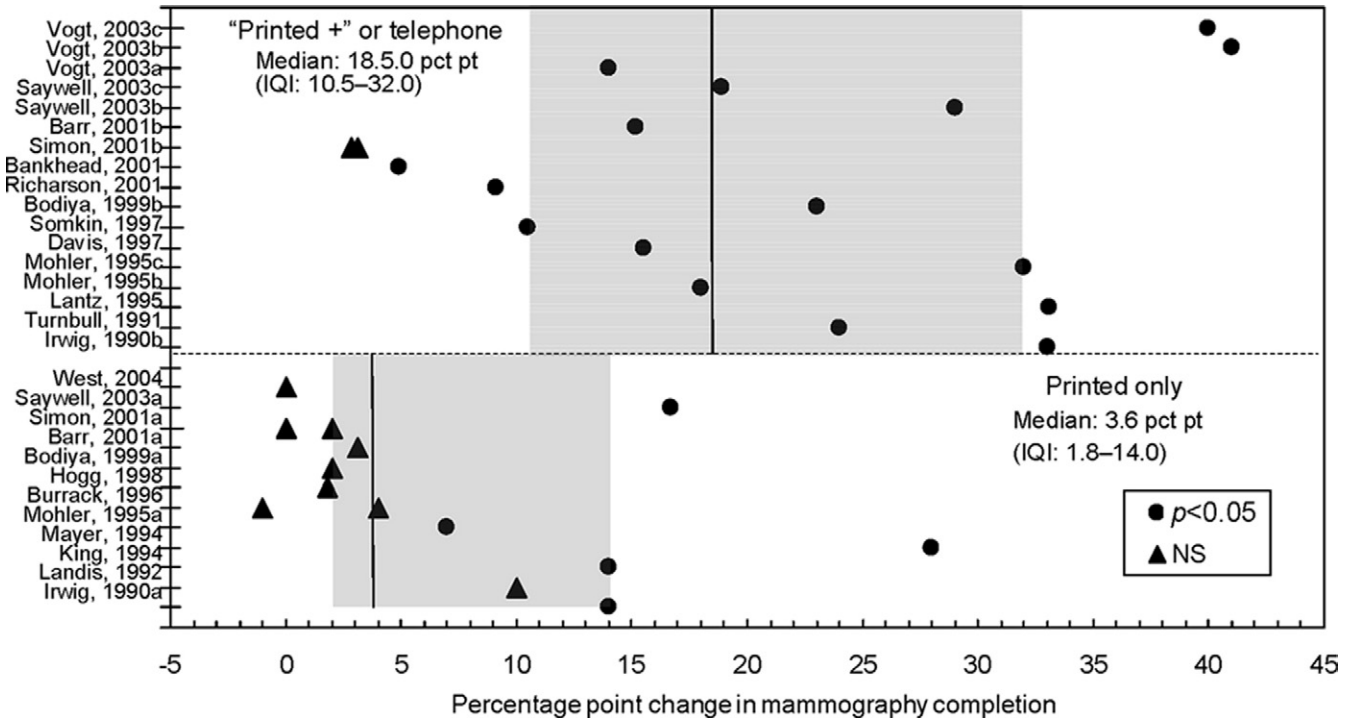



**Figure 2.** Percentage point change in completed mammogram screening attributable to client reminders (printed reminders only versus printed reminders plus additional components or telephone reminders). IQI, interquartile interval; NS, nonsignificant

(with[47] or without[44] education), or with a second telephone reminder offering scheduling assistance.[61] Five interventions included tailored (barrier-specific) counseling, four by telephone[47,57,61] and one in person.[57]

Overall, the median post-intervention increase in completed mammography was 14.0 percentage points (interquartile interval [IQI]=2.0, 24.0). The magnitude of this effect and consistent positive results across studies and reminder systems demonstrate the effectiveness of client reminders in increasing breast cancer screening by mammography. Nonetheless, as indicated in Figure 2, simple printed reminders, when used alone, appear to result in effects of smaller magnitude (median 3.6 percentage points; IQI=1.8, 14.0) than reminders used with additional components or conveyed by telephone (median 18.5 percentage points; IQI=10.5, 32.0). This observation is further supported by all nine intrastudy comparisons identified in this review,[44,45,53,56–58] which are shown in Figure 2. There was no single component or combination of components found to account for larger effect sizes.

**Applicability.** The same body of evidence was used to evaluate the applicability of client reminders for increasing breast cancer screening in different populations and settings. Where population and setting characteristics were specified, effective interventions were conducted in the U.S. and Australia, among African Americans and whites, and in populations of low to mixed or middle-class SES. Certain major population subgroups, including Hispanics and Asians, had limited representation in these studies. Interventions were also effective in HMOs and other clinical settings, in community settings, and in both rural and urban locations. Client reminders should be applicable across a range of settings and populations, provided they are adapted to target populations and delivery context.

Only two studies reported on populations of women who had never been screened. One[59] demonstrated a 24 percentage point increase in adherence following printed reminders delivered with prescheduled appointments (reminders of lesser intensity were not evaluated). The other[57] showed that printed reminders alone were effective when delivered to women with a prior history of mammography (19.0 percentage point increase, $p<0.05$) but not to those who had never been screened (−3.4 percentage point change). At the same time, the study demonstrated these reminders were effective in both groups (23.7 percentage point increase, $p<0.05$, and 45.5 percentage point increase, $p=0.09$, respectively) when they included an educational component. Such findings suggest the utility of enhancing simple reminders with additional intervention elements when targeting populations of women who have never been screened or who may be hard to reach (see Research Issues, Client Reminders).

**Economic efficiency.** Six studies, five classified as good[45,47,56,57,62] and one as very good[51] met inclusion criteria[8] for cost-effectiveness analysis of client reminders in increasing breast cancer screening by mammography. For one study,[57] cost effectiveness reported in

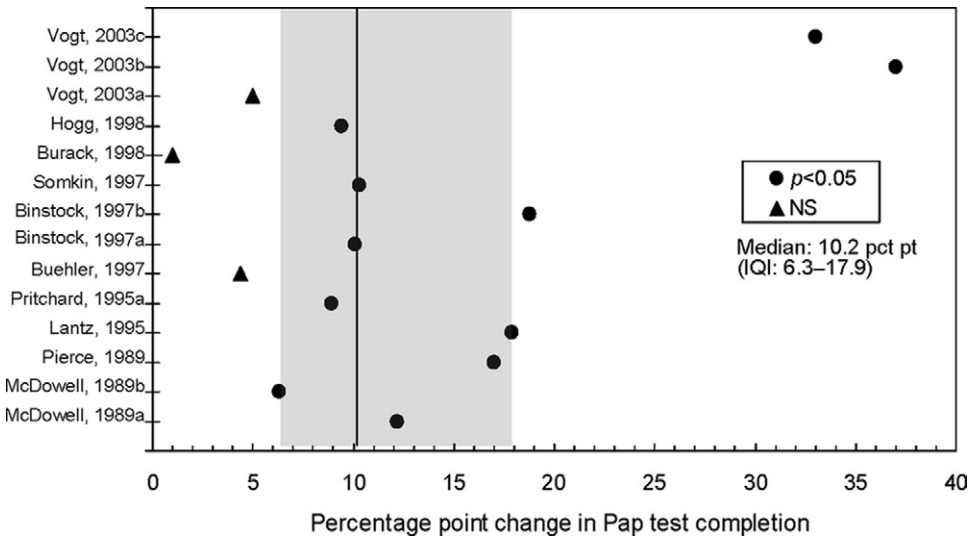



**Figure 3.** Percentage point change in completed Pap test screening attributable to client reminders. IQI, interquartile interval; NS, nonsignificant

terms of cost per percentage point increase in screening rates was converted by *Community Guide* staff to cost per additional screening examination. From ten intervention arms studied, estimated cost per additional screening ranged from $4.89 to $100.61. One study with three intervention arms[56] based estimates on a simple telephone reminder delivered by nonphysician staff ($4.89), a printed reminder from the physician ($43.12), and a telephone reminder by the physician ($100.61). A second study with three intervention arms[57] based estimates on a reminder letter from a physician ($7.66) and a similar letter supplemented by face-to-face ($62.16) or telephone ($71.85) counseling. Two separate studies using similar methods and reported by the same investigators estimated cost effectiveness of letters signed by members of group general practices and mailed with other educational materials to women being advised that screening was due ($47.01)[51] and to women who had not responded to an earlier notice ($63.28).[62] Each of these estimates was likely inflated by including both management of increased clinic attendance and additional consultation costs, which are beyond those of the intervention to promote screening. Finally, one study assessed cost effectiveness of a letter from a radiology department followed by a phone call ($9.56)[45] and one assessed a telephone reminder with counseling ($22.00).[47] The range of estimates from these studies made it difficult to ascertain the most cost-effective approach although, based on relatively few studies, physician participation and enhancement of reminders seem to add to the cost of intervention.

## Cervical Cancer

**Effectiveness.** Twenty-one studies[24–26,39,48,50,52,61,63–75] of greatest design suitability were identified that reported using client reminders to increase cervical cancer screening by Pap test. Of these, eight studies[24–26,63–67] were excluded due to limited quality of execution and two[39,68] were excluded because comparison groups received different reminders or reminders of lesser intensity than study groups. Of 11 remaining studies qualifying for review, ten[48,50,52,69–75] had fair quality of execution and one[61] had good quality of execution.

Most of the 11 qualifying studies enrolled women who had not been screened in at least 3 years, although one[72] specified 5 years, one[73] specified at least 2 years, and two[71,75] specified 1 year. Pap test completion was ascertained in each study by record reviews. Qualifying studies evaluated 15 intervention arms. One study[61] evaluated three interventions, two studies[69,71] evaluated two interventions, and the remaining studies evaluated one intervention. Nine intervention arms included printed reminders alone[48,50,52,69,70,72–75]; three included printed reminders combined with a follow-up printed[61,71] or telephone[61] reminder, with[61] or without[71] scheduling assistance; and three included telephone reminders alone[69] or combined with either scheduling assistance alone[61] or with scheduling assistance and a tailored (barrier-specific) educational component.[71]

Overall, the median post-intervention increase in Pap test completion over 14 intervention arms was 10.2 percentage points (IQI=6.3, 17.9; Figure 3). The magnitude of this effect and the consistency across studies and reminder systems demonstrate that client reminders are effective in increasing cervical cancer screening by Pap test. Effectiveness is further supported by findings from an evaluation of a printed reminder alone,[74] which showed a statistically significant OR in a favorable direction but was not included in the analysis because it could not be converted to a percentage point change.

A smaller effect was observed from printed reminders used alone ($n$=8, median 9.8 percentage points) than from reminders with additional components or conveyed by telephone ($n$=6, median 15.5 percentage points). This difference, however, is supported by only one available intrastudy comparison.[69]

**Applicability.** The same body of evidence was used to evaluate the applicability of client reminders for cervical cancer screening in different populations and settings. Effective intervention studies that specified population and setting were conducted in the U.S., Canada, Australia, and the United Kingdom, among African Americans and whites, and in populations of low SES. Certain major population subgroups, including Hispanics and Asians, had limited representation in these studies. Interventions were also effective in HMOs and a large medical practice, in community settings, and in both urban and rural locations. Client reminders for cervical cancer screening should be applicable across a range of settings and populations, provided they are adapted to target populations and delivery context. Only one study[72] reported an outcome for a subset of women with no previous Pap test history. In this study, a simple printed reminder was effective in increasing the Pap test completion rate among these women (13 percentage points, $p<0.05$) and among women whose last Pap tests were ≥5 years earlier (22 percentage points, $p<0.05$). However, because few studies are available to assess these interventions in populations of women who have never been screened or who may be hard to reach, questions remain about their applicability in these groups (see Research Issues, Client Reminders).

**Economic efficiency.** Four studies[69,71,74,76] met inclusion criteria[8] for cost-effectiveness analysis of client reminders in increasing cervical cancer screening by Pap test. Three studies[69,71,74] were classified as good and one[76] was classified as very good. In seven intervention arms studied, cost per additional screening ranged from $14.27 to $151.00. The lowest estimates were based on simple printed ($14.27) and telephone ($17.11) reminders in one study,[69] and on a printed reminder that included an informational brochure and was later followed by a second reminder to nonrespondents ($18.69) and a telephone reminder that included one-on-one counseling ($17.03) in another study.[71] Two intermediate estimates were based on reminder letters that did ($85.23) or did not ($100.36) provide a designated appointment time; however, these estimates also included substantial fixed costs.[76] The highest cost-effectiveness estimate, $151.00,[74] was from a population-based personal printed reminder to unscreened and underscreened women identified through a cytology registry. However, this estimate included the cost of physician participation and laboratory resources to conduct and process the additional Pap tests resulting from the intervention. These costs are not typically assigned as intervention costs, and their contribution to overall costs could not be determined by *Community Guide* staff. Thus, the last estimate likely represents an unspecified inflation of the true cost per additional cancer screening for this intervention.

## Colorectal Cancer

**Effectiveness.** Seven studies[24,25,43,48,77–79] of greatest design suitability were identified that reported using client reminders to increase colorectal cancer screening by guaiac-based FOBT; no studies were found of screening by flexible sigmoidoscopy, colonoscopy, or barium enema. Two studies[24,25] were excluded due to limited quality of execution and one[43] was excluded because the comparison group also received a reminder, although different from that of the study group. The remaining four qualifying studies,[48,77–79] all had fair quality of execution.

Each study enrolled eligible men and women due or overdue for annual FOBT, and confirmed test completion by record reviews. The four qualifying studies evaluated eight intervention arms. One study[77] evaluated three interventions, two studies[78,79] each evaluated two interventions, and one study[48] evaluated one intervention. Three[48,77,79] interventions included printed reminders alone; one[77] intervention assessed printed reminders with follow-up telephone reminders; and four[77–79] interventions included telephone reminders alone or following distribution of an informational booklet.[78] None of the interventions were tailored to address individual-specific barriers to screening.

Effects of all eight interventions were in the favorable direction, with a median post-intervention increase of 11.5 percentage points (IQI=8.9, 20.3; Figure 4). The magnitude of this effect and the consistent positive results across studies and reminder systems demonstrate that client reminders are effective in increasing colorectal cancer screening by FOBT. There were too few studies to evaluate effect size by type of reminder, either across or within studies.

**Applicability.** The same body of evidence was used to evaluate the applicability of client reminders for increasing colorectal cancer screening by FOBT in different settings and populations. Effective intervention studies that specified settings were conducted in HMOs in the U.S. and in clinics in Canada and Israel. These studies offered limited or no additional description of the socioeconomic, racial, ethnic, or screening backgrounds of study participants, or of the geographic settings in which the studies were conducted. However, given related bodies of evidence on reminders for breast and cervical cancer, client reminders for colorectal cancer screening by FOBT should be applicable over a range of settings and populations, provided they are adapted to target populations and delivery context.

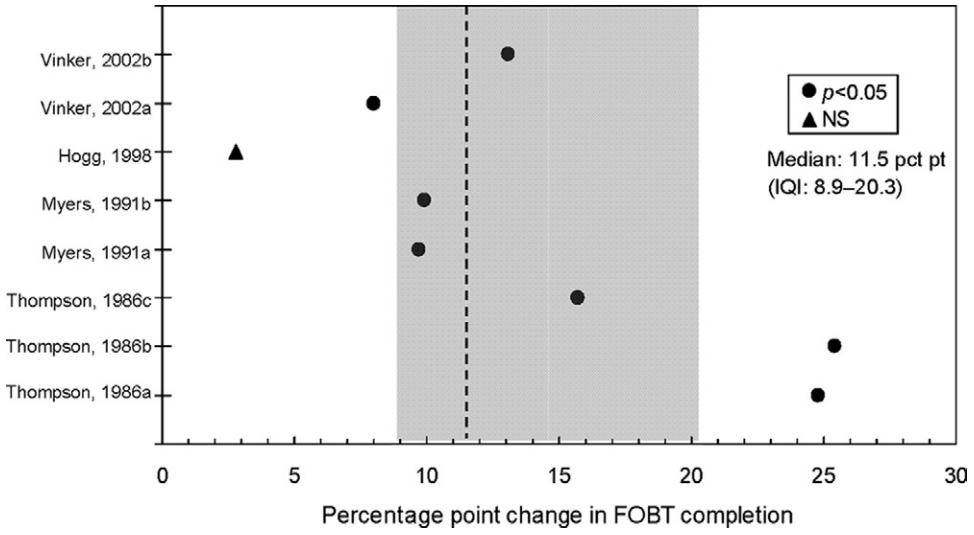



**Figure 4.** Percentage point change in completed FOBT screening attributable to client reminders. IQI, interquartile interval; NS, nonsignificant

These findings would not apply to screening by flexible sigmoidoscopy, colonoscopy, or double contrast barium enema, because none of the qualifying studies addressed these procedures.

**Economic efficiency.** One study[77] met inclusion criteria[8] for cost-effectiveness analysis of client reminders in increasing colorectal cancer screening by guaiac-based FOBT. Reminders included a postcard alone, a phone reminder alone, or a combination of the two. Costs per additional screening, calculated by *Community Guide* economists from reported data, were $6.17 for the postcard, $55.41 for the telephone reminder, and $38.30 for the combination. The reminder postcard alone therefore appeared to be most cost-effective for increasing colorectal cancer screening in this study.

### Conclusions About Client Reminders

According to *Community Guide* methods,[16] there is strong evidence that client reminders increase breast and cervical cancer screening by mammography and Pap test, respectively. These findings should apply across a range of settings and populations. Although evidence also suggests that enhancement of simple printed reminders with additional messages or support to clients results in greater effectiveness, particularly for breast cancer screening, it is not yet known whether such enhancement increases effectiveness among women who have never been screened or who may be hard to reach.

There is sufficient evidence that client reminders increase colorectal cancer screening by guaiac-based FOBT. Evidence is insufficient, however, to determine whether client reminders are effective in increasing colorectal cancer screening by flexible sigmoidoscopy, colonoscopy, or double contrast barium enema, because no qualifying studies addressed these procedures.

## Results: Client Incentives

Client incentives are small, noncoercive rewards (e.g., cash or coupons) to motivate people to seek cancer screening for themselves or to encourage others (e.g., family members, close friends) to seek screening. Incentives are distinct from interventions designed to improve access to services (e.g., transportation, child care, reducing out-of-pocket client costs), reviewed elsewhere in this supplement.[13]

### Breast, Cervical, and Colorectal Cancers

**Effectiveness.** No studies were found that reported use of client incentives alone to increase screening for breast, cervical, or colorectal cancers. Therefore, evidence was insufficient to determine the effectiveness of this intervention when used alone.

Because intervention effectiveness was not established, the general applicability of client incentives in breast, cervical, or colorectal cancer screening was not addressed, nor was a search made for evidence of economic efficiency.

### Conclusions About Client Incentives

According to *Community Guide* methods,[16] there is insufficient evidence to determine the effectiveness of client incentives alone in increasing screening for breast, cervical, or colorectal cancer, because no studies qualified for review.

## Results: Mass Media

Mass media—including television, radio, newspapers, magazines, and billboards—are used to communicate educational and motivational information in community or larger-scale intervention campaigns. Mass media

interventions, however, almost always include other components or attempt to capitalize on existing interventions and infrastructure. For example, such interventions have been shown to be effective in reducing alcohol-related motor vehicle crashes when implemented with ongoing law enforcement and other programs to reduce drinking and driving.[80] More commonly, mass media occupy a prominent role in broader community-wide campaigns in which they are combined with one or more other components; such multicomponent mass media campaigns have been found to be effective in promoting child safety seat use[81] and physical activity,[82] and preventing or reducing adolescent tobacco use.[83] Small-media messages and group or one-on-one education (see below) are often included in these programs, based on the rationale that use of mass media to raise awareness and increase knowledge is most effective in changing health behaviors when combined with messages delivered through other channels.[84] At the same time, the individual contribution of mass media to the effectiveness of these multicomponent interventions and the effectiveness of mass media, when used alone, remain uncertain.

### Breast, Cervical, and Colorectal Cancers

**Effectiveness.** No studies were found of mass media used alone to increase breast or colorectal cancer screening. Therefore, evidence was insufficient to determine effectiveness.

Three studies[85–87] were identified that evaluated the effectiveness of mass media alone in increasing cervical cancer screening (one study[85] repeated the intervention in two separate geographic areas). One study [87] was excluded due to limited quality of execution. The others, both with fair quality of execution, were of greatest[85] and least[86] suitable study design and included three intervention arms.

Post-intervention changes in Pap test completion ascertained by record reviews were reported as 20.4% and 47.6% (relative) increases in one study[85] and 21.3% in the other.[86] These measures could not be converted to absolute change. Because there were too few studies of adequate quality, evidence is insufficient to determine the effectiveness of mass media when used alone in increasing cervical cancer screening.

Because intervention effectiveness was not established, the general applicability of mass media use alone in breast, cervical, or colorectal cancer screening was not addressed, nor was a search made for evidence of economic efficiency.

### Conclusions About Mass Media

According to *Community Guide* methods,[16] there is insufficient evidence to determine the effectiveness of mass media alone in increasing screening for breast and colorectal cancer because no studies qualified for review, and for cervical cancer because too few studies of adequate quality qualified for review.

## Results: Small Media

Small media include videos or printed materials (e.g., letters, brochures, pamphlets, flyers, or newsletters). These can be distributed from healthcare systems or other community settings, and can convey educational or motivational information to promote cancer screening in target populations. Messages may describe screening tests and procedures and include indications for, benefits of, and ways to overcome barriers to screening. Messages are often based on behavior theories which posit that change in predisposing factors, such as attitudes, beliefs, and knowledge, are necessary but not sufficient to achieve behavior changes.[2,84] These messages may be untailored to address a general target population or tailored to address unique psychological and behavioral characteristics identified through individual assessments.[88]

### Breast Cancer

**Effectiveness.** Twenty studies[89–108] were identified that reported using small media to increase breast cancer screening by mammography. One[108] study was excluded due to limited quality of execution. Of 19 qualifying studies, 17 had greatest design suitability, of which three[90,92,98] had good quality of execution and 14[89,91,93–96,99–101,103–107] had fair quality of execution. Two qualifying studies, one with moderate[97] and one with least[102] suitable study design, had fair quality of execution. Five studies[90,92,100,105,107] evaluated tailored interventions, twelve[89,91,93–98,101,102,104,106] evaluated untailored interventions, and two studies[99,103] included both a tailored and an untailored intervention.

Qualifying studies measured post-intervention change in completed mammography based on self-reports[89–92,97,100,103–105,107] or record reviews.[93–96,98,99,101,102,106] Tailored interventions used booklets,[90,100] personalized letters,[92,99,107] or other printed materials.[105] Untailored interventions used personal checklists or record-keeping booklets,[89,94,95] printed information distributed at medical facilities,[93,98,103] informational or motivational posters and videos in patient waiting[102] or other[104] areas, letters,[91,97,99,101,106] or a video with brochures.[93] One study[104] was excluded from analysis because it only compared three variations of an informational slide show, and one[96] was excluded because it only reported the outcome measure as "not significant." The 17 studies analyzed included 21 intervention arms (four studies[93,99,101,103] each evaluated two separate interventions).

Overall, the median post-intervention increase in completed mammography was 7.0 percentage points

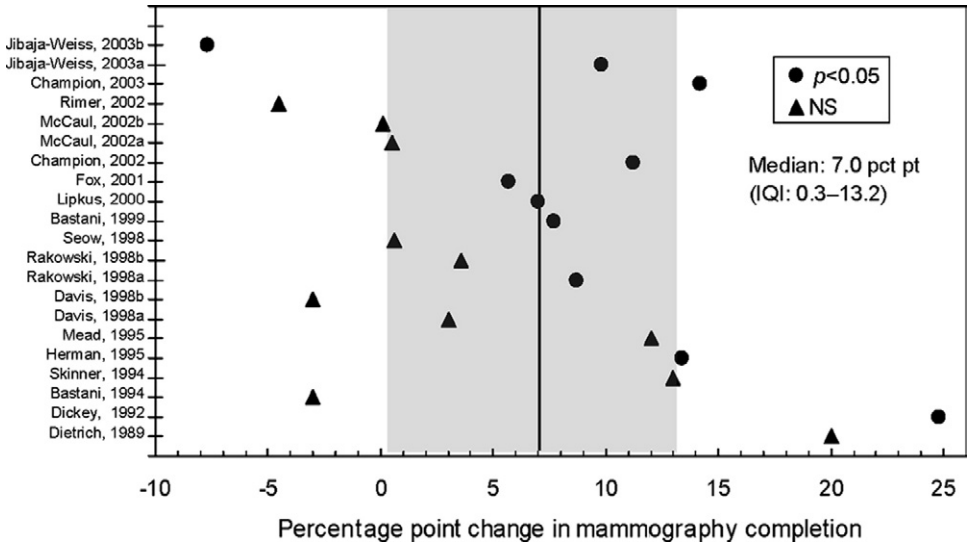



**Figure 5.** Percentage point change in completed mammogram screening attributable to small media. IQI, interquartile interval; NS, nonsignificant

(IQI=0.3, 13.2; Figure 5). The magnitude of this effect and the consistent positive results across studies demonstrate the effectiveness of small media in increasing breast cancer screening by mammography.

Median increases for tailored ($n$=7) and untailored ($n$=14) small media were 7.0 (IQI=−4.5, 11.2) and 4.7 (IQI=0.5, 13.4) percentage points, respectively. Only two studies directly compared a tailored and an untailored intervention arm. In one,[103] the tailored intervention was more effective by 5.1 percentage points, whereas in the other,[99] the untailored intervention was more effective by 17.5 percentage points. Overall, studies in this review did not report sufficient information to examine how the relative effectiveness of tailored and untailored interventions may vary by population characteristics.

**Applicability.** The same body of evidence was used to evaluate the applicability of small media in increasing mammography in a variety of settings and populations. Effectiveness was demonstrated in Australia, the United Kingdom, and in diverse U.S. populations—including African Americans, whites, and Hispanics—and among women of low SES. Effectiveness was also shown in both rural and urban settings. Findings should generally apply to both tailored and untailored interventions across a range of populations, provided the intervention program is appropriately adapted to the target population and delivery context. The body of evidence was not large enough to determine the relative effectiveness and merits of tailored and untailored approaches overall or whether individuals with certain characteristics benefit from tailored interventions.

**Economic efficiency.** No studies were found meeting inclusion criteria for review of the economic efficiency of small media in increasing breast cancer screening.

## Cervical Cancer

**Effectiveness.** Fourteen studies[94,95,99,102,108–117] were identified that reported using small media to increase cervical cancer screening by Pap test. Two studies[108,111] were excluded because of limited quality of execution. Of the 12 qualifying studies, 11 had greatest design suitability, of which two[113,115] had good quality of execution and nine[94,95,99,109,110,112,114,116,117] had fair quality of execution. One[102] study had a least suitable study design and fair quality of execution. Two studies[99,115] included a tailored intervention.

Qualifying studies measured post-intervention change in completed Pap tests based on record reviews. Two studies[94,95] used personal checklists or record booklets to inform and prompt participants; two used videos in patient waiting areas with[102] or without[117] posters; seven used mailed leaflets,[113] brochures,[112] or letters;[99,109,110,114,115] and one[116] used a combination of mailed information in printed and video format. The 12 qualifying studies included 15 intervention arms (two studies[99,109] evaluated two separate interventions and one study[117] conducted the same intervention in two separate clinics).

Overall, the median post-intervention increase in Pap test completion for 12 intervention arms was 4.5 percentage points (IQI=0.2, 9.0; Figure 6). The magnitude of this effect and consistent positive results across studies demonstrate the effectiveness of small media in increasing cervical cancer screening by Pap test. Effectiveness is further supported by three intervention arms[109,110] showing statistically significant relative increases in screening completion, findings not

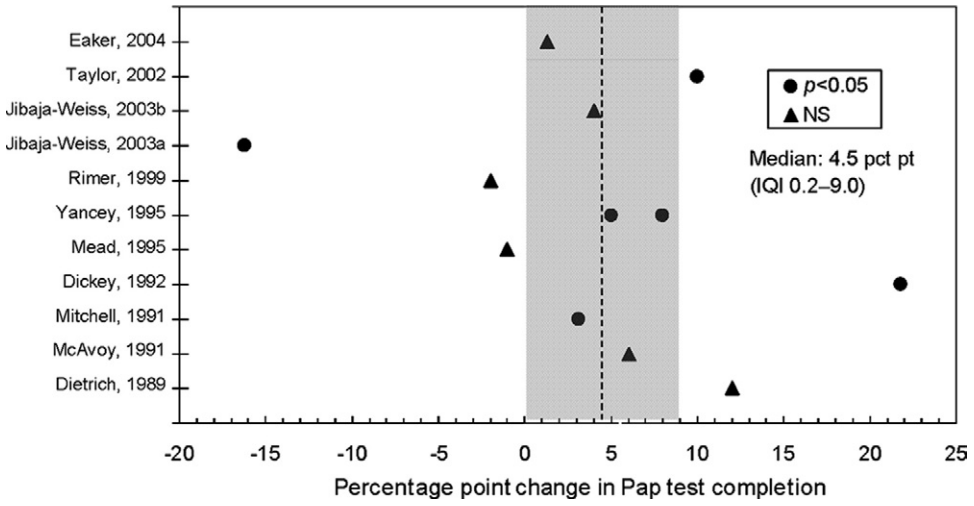



**Figure 6.** Percentage point change in completed Pap test screening attributable to small media. IQI, interquartile interval; NS, nonsignificant

included in the analysis because they could not be converted to percentage point change.

In the only studies of tailored interventions, one[99] suggested the tailored intervention (personalized letter) was 22.2 and 16.2 percentage points less effective than an untailored intervention and no intervention, respectively; the other[115] suggested that tailored print material was no more effective (i.e., 2 percentage points less) than the usual practice offered relative to the comparison group.

**Applicability.** The same body of evidence was used to evaluate the applicability of small-media interventions in increasing cervical cancer screening by Pap test in a variety of settings and populations. Effectiveness was demonstrated in Australia and in diverse U.S. populations, including African Americans, whites, and Hispanics, and women of low SES. Findings should be applicable across a range of populations, provided the intervention program is appropriately adapted to the target population and delivery context. There was not enough information to generalize the findings about the effectiveness of tailored interventions in increasing cervical cancer screening or to ascertain which individuals benefit from tailored interventions.

**Economic efficiency.** One study,[109] classified as satisfactory, estimated the cost of an untailored informational letter to be $15.82 per additional Pap test completed.

## Colorectal Cancer

**Effectiveness.** Nine studies[94,108,118–124] were identified that reported using small media to increase colorectal cancer screening by guaiac-based FOBT; no studies of screening by flexible sigmoidoscopy, colonoscopy, or barium enema were found. Two studies[108,122] were excluded because of limited quality of execution. The remaining seven[94,118–121,123,124] qualifying studies each had greatest suitability of design and fair quality of execution. One study[120] evaluated a tailored intervention.

Qualifying studies measured post-intervention change in completed FOBT based on self-reports[120] or record reviews.[94,118,119,121,123,124] One study[94] used a personal record booklet; three[118,119,124] used leaflets or pamphlets; two[120,123] mailed out videos, newsletters, or other printed materials; and one[121] mailed a sequence of two letters. The seven qualifying studies included nine intervention arms (two studies[123,124] each evaluated two separate interventions). The median post-intervention increase in completed FOBT for eight intervention arms was 12.7 percentage points (IQI=0, 26.4; Figure 7). The magnitude of this effect and the consistent positive results across studies demonstrate the effectiveness of small media in increasing colorectal cancer screening by FOBT. Effectiveness is further supported by an intervention arm[118] showing a statistically significant OR in the favorable direction, a finding not included in the analysis because it could not be converted to percentage point change.

**Applicability.** The same body of evidence was used to evaluate the applicability of these interventions in a variety of settings and populations. Effectiveness was demonstrated in studies in the United Kingdom and the U.S., among African-American and white populations, and among some low-SES populations. Studies were conducted in urban and rural populations and included study participants from both clinical and community settings. It is likely that the findings are applicable in increasing colorectal cancer screening by FOBT across a range of populations, provided the intervention program is adapted to the target population and delivery context. These findings do not apply to flexible sigmoidoscopy, colonoscopy, or double contrast barium enema, because no qualifying studies

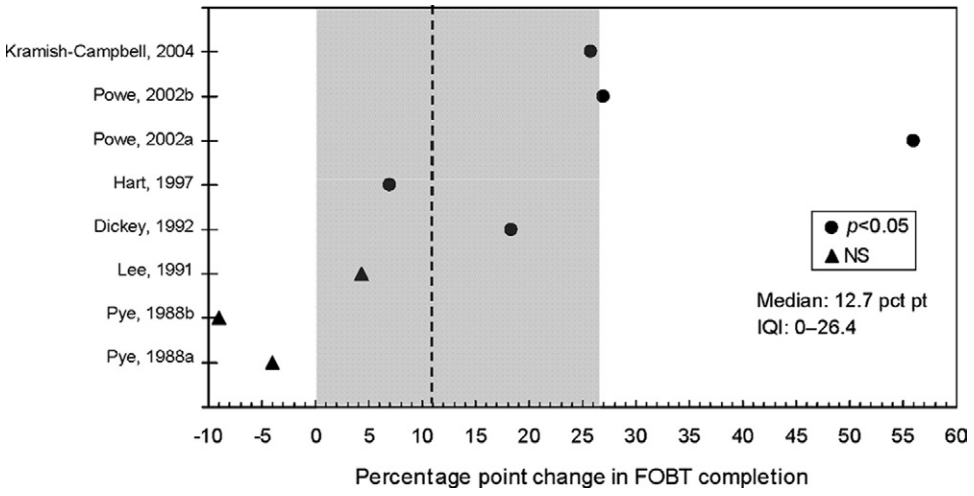



**Figure 7.** Percentage point change in completed FOBT screening attributable to small media. IQI, interquartile interval; NS, nonsignificant

addressed these procedures. Because there was only one tailored intervention study, it was not possible to evaluate the relative effectiveness of tailored versus untailored efforts to increase FOBT or to ascertain which individuals benefit from tailored interventions.

**Economic efficiency.** One study[120] estimated the cost of producing a series of tailored newsletters and targeted videos for delivery to 76 people to be $141.60 per additional guaiac-based FOBT completed. Costs per additional screening were calculated by *Community Guide* staff from reported data.

### Conclusions About Small Media

According to *Community Guide* methods,[16] there is strong evidence that small media increase breast, cervical, and colorectal cancer screening by mammography, Pap test, and guaiac-based FOBT, respectively. These findings should apply across a range of settings and populations. Evidence, however, is insufficient to determine whether small media is effective in increasing colorectal cancer screening by flexible sigmoidoscopy, colonoscopy, or double contrast barium enema, because no qualifying studies addressed these procedures. For breast cancer screening, the findings apply to both tailored and untailored interventions, although questions remain about the relative effectiveness of tailored versus untailored small-media messages and which individuals benefit from tailored interventions.

## Results: Group Education

Group education conveys information on indications for, benefits of, and ways to overcome barriers to screening with the goal of informing, encouraging, and motivating participants to seek recommended screening. Group education is usually conducted by health professionals or by trained laypeople who use slide presentations or other teaching aids in a lecture or interactive format, and often incorporate role modeling or other methods.[84] Because group education can be given to a variety of groups, in different settings, and by different types of educators with different backgrounds and styles, it has been difficult to generalize about the effectiveness of these interventions.

### Breast Cancer

**Effectiveness.** Nine studies[125–133] were identified that reported using group education to increase breast cancer screening by mammography. Two studies[125,126] were excluded due to limited quality of execution. Six of the seven qualifying studies were of greatest design suitability, one[130] having good quality of execution and five[127,129,131–133] having fair quality of execution. One[128] qualifying study had a least suitable design and fair quality of execution. Interventions offered educational information in lecture or interactive format or both.

The seven qualifying studies evaluated post-intervention change in mammography completion based on self-reports. These studies evaluated eight intervention arms (one[127] study conducted two separate interventions). Overall, the median post-intervention change in mammography was 9.0 percentage points (IQI=4.0, 24.0). However, because findings were inconclusive from four of the eight study arms (the only study with greatest design suitability and good quality of execution[130] reported a –1.0 percentage point change and three[129,131,133] measures, with changes ranging from 3.0 to 7.0 percentage points, were not statistically significant), evidence was insufficient to determine whether group education is effective in increasing breast cancer screening.

Because intervention effectiveness was not established, the general applicability of group education in breast cancer screening was not addressed, nor was a search made for evidence of economic efficiency.

### Cervical Cancer

**Effectiveness.** Four studies[125,129,133,134] were identified that reported using group education to increase cervical cancer screening by Pap test. Two studies[125,134] were excluded from review because of limited quality of execution. Both qualifying studies[129,133] were of greatest design suitability and had fair quality of execution. The interventions were culturally targeted to Hispanic[129] and Filipino-American[133] women and were offered in an interactive and a combined lecture-interactive format, respectively.

Both qualifying studies evaluated post-intervention change in Pap test completion based on self-reports. One[129] reported an increase of 9 percentage points ($p<0.05$) and the other[133] reported no change following the culturally targeted interventions. Because there were only two studies with inconsistent findings, evidence was insufficient to determine the effectiveness of group education in increasing cervical cancer screening.

Because intervention effectiveness was not established, the general applicability of group education in cervical cancer screening was not addressed, nor was a search made for evidence of economic efficiency.

### Colorectal Cancer

**Effectiveness.** A single multi-arm study[135] was identified that reported using group education to increase colorectal cancer screening by guaiac-based FOBT. The study, of greatest design suitability and good quality of execution, included three didactic interventions conducted at communal meal sites for older citizens (mean age, 72 years). Each was evaluated based on the number of returned FOBT kits. Two study arms using different approaches resulted in 5.0 and −13.0 percentage point differences ($p>0.05$ for both) in kits returned and one arm combining both approaches resulted in a 37 percentage point change ($p<0.05$). Because intrastudy findings were inconsistent, evidence was insufficient to determine effectiveness of group education in increasing colorectal cancer screening by FOBT.

Because intervention effectiveness was not established, the general applicability of group education in colorectal cancer screening was not addressed, nor was a search made for evidence of economic efficiency.

### Conclusions About Group Education

According to *Community Guide* methods,[16] there is insufficient evidence to determine the effectiveness of group education in increasing screening for breast, cervical, and colorectal cancer. This was due to inconclusive findings for breast cancer; too few studies with inconsistent findings for cervical cancer; and inconsistent findings among multiple intervention arms in the only study for colorectal cancer.

## Results: One-on-One Education

One-on-one education conveys information to individuals by telephone or in person on indications for, benefits of, and ways to overcome barriers to screening with the goal of informing, encouraging, and motivating them to seek recommended screening. These messages are delivered by healthcare workers or other health professionals, lay health advisors, or volunteers, and are conducted in medical, community, worksite, or household settings. Interventions can be untailored to address a general target population or tailored to reach specific individuals based on unique psychological and behavioral characteristics as derived from individual assessments.[88] As defined for this review, one-on-one education may be accompanied by a small-media or a client reminder component.

### Breast Cancer

**Effectiveness.** Twenty-six studies[41,54,57,91,92,100,105,136–154] were identified that reported using one-on-one education to increase breast cancer screening by mammography. One study[136] was excluded due to limited quality of execution. All 25 qualifying studies were of greatest design suitability; five[41,92,142,147,154] had good quality of execution and the remaining 20 had fair quality of execution.

Qualifying studies evaluated completed mammography, either self-reported[54,57,91,92,100,105,137–143,145–150,153] or confirmed by record reviews.[41,144,151,152,154] These 25 studies evaluated 35 intervention arms: 14 studies[54,91,92,100,105,140–143,145,146,148,149,154] evaluated 17 tailored intervention arms (two studies[91,142] evaluated two intervention arms, and one study[143] evaluated the same intervention in two distinct populations); eight studies[41,57,137,144,150–153] evaluated ten untailored intervention arms (two studies[41,57] evaluated two intervention arms); two studies[138,139] each evaluated two tailored arms and one untailored intervention arm; and one study[147] evaluated one tailored and one untailored arm.

Overall, the median post-intervention increase in completed mammography for 31 intervention arms was 9.3 percentage points (IQI=4.9, 15.0; Figure 8). ORs from four additional intervention arms[139,146] could not be converted to percentage point change but were in the favorable direction.

Effectiveness did not vary by intervention site (medical versus nonmedical setting), mode of delivery (telephone versus in person), or training status of the person delivering the intervention. Overall, there was no difference between tailored ($n=19$, median increase 9.3 percentage points) and untailored interventions ($n=12$, median in-

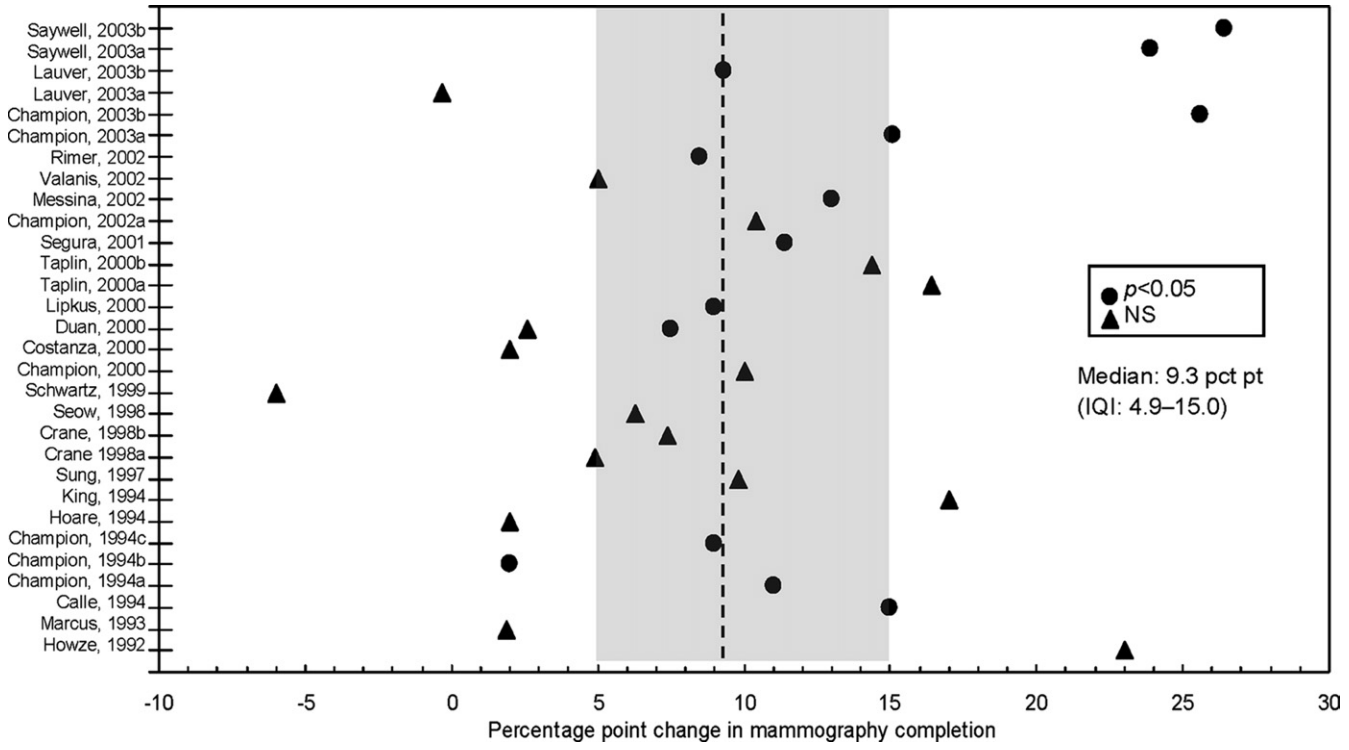



**Figure 8.** Percentage point change in completed mammogram screening attributable to one-on-one education. IQI, interquartile interval; NS, nonsignificant

crease 10.6 percentage points). Of three studies with intrastudy comparisons, however, two[138,139] demonstrated that both tailored interventions in the respective study were more effective than an untailored intervention (11.0 and 9.0 percentage point increases vs 2.0 percentage points in one[138] and ORs of 2.3 and 2.0 vs 1.5 in the other[139]), and the third[147] also demonstrated greater effectiveness in the tailored than the untailored intervention (9.3 vs −3.0 percentage points).

**Applicability.** The same body of evidence was used to evaluate the applicability of these findings in a variety of settings and populations. Studies were conducted in the U.S., the United Kingdom, Spain, and Singapore, in clinical and nonclinical (including household) and urban and rural settings, and included African-American, white, Hispanic, and Asian women with and without recent or previous history of screening mammography. Findings should generally apply to both tailored and untailored interventions across a range of populations, provided the intervention program is adapted to the target population and delivery context. There is some evidence from within single studies that tailoring increases effectiveness. At the same time, however, the body of evidence is not large enough to ascertain which individuals benefit from tailored interventions.

**Economic efficiency.** Three studies[57,155,156] met inclusion criteria[8] for analysis of cost effectiveness of one-on-one education in increasing breast cancer screening by mammography. Two studies[57,155] were classified as good and one[156] was classified as very good. One study[57] used only direct variable costs and reported cost-effectiveness estimates of $60.47 per additional person screened for one-on-one education delivered in person and $99.37 for delivery by telephone. Two studies assessed costs from a societal perspective and included fixed costs (use of facility and other infrastructure resources) related to the mammography visit itself.[155,156] One of these studies[155] reported a $103.99 cost-effectiveness estimate for telephone message delivery without a motivational component and a $156.55 estimate for the same intervention with a motivational component. The motivational intervention was both slightly less effective and substantially more costly than the nonmotivational intervention. The other study estimated cost effectiveness of tailored, barrier-specific telephone counseling at $216, $559, or $1036 per additional mammogram, depending on whether labor and other resources were volunteered and donated, whether they were offered at minimum wage and actual cost, or whether they were based on prevailing wage and commercial cost, respectively.[156] This study also estimated cost per life year saved at $14,532 for the intervention.

## Cervical Cancer

**Effectiveness.** Eight studies[64,113,153,154,157–160] were identified that reported using one-on-one education to increase cervical cancer screening by Pap test. Three studies[64,157,158] were excluded due to limited quality of

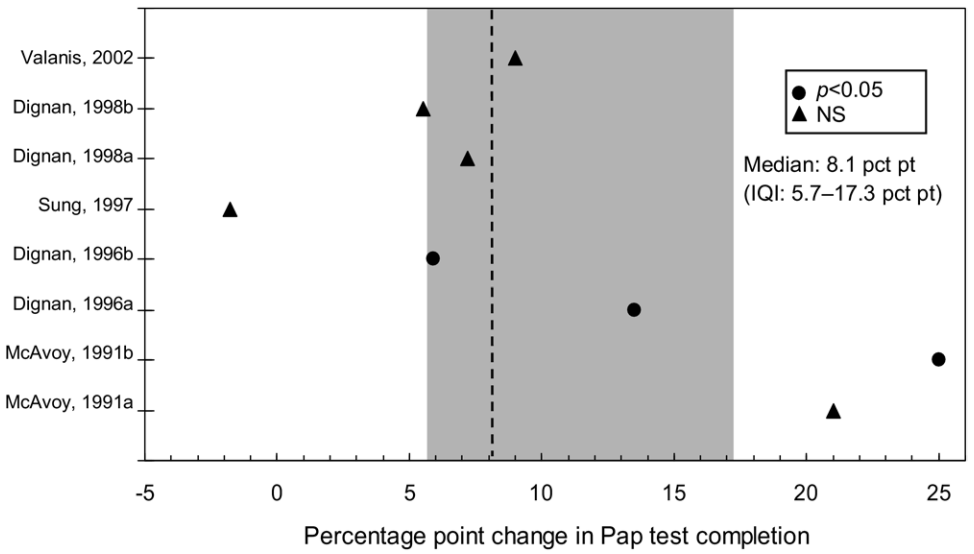



**Figure 9.** Percentage point change in completed Pap test screening attributable to one-on-one education. IQI, interquartile interval; NS, nonsignificant

execution. All five qualifying studies were of greatest design suitability; two[113,154] had good quality of execution and three[153,159,160] had fair quality of execution.

Qualifying studies evaluated completed Pap test screening using either self-reports[154,159,160] or record reviews.[113,153] The five qualifying studies evaluated eight intervention arms. Three studies[154,159,160] evaluated five tailored intervention arms and two studies[113,153] evaluated three untailored intervention arms. The median post-intervention increase in Pap test completion over the eight study arms was 8.1 percentage points (IQI=5.7, 17.3; Figure 9). Overall, the magnitude of this effect and the consistent positive results across studies demonstrate that one-on-one education interventions are effective in increasing cervical cancer screening by Pap test.

There were too few interstudy measures (and no intrastudy comparisons) to distinguish effectiveness by use of tailoring, or by intervention site, mode of delivery, or training status of the interventionist.

**Applicability.** The same body of evidence was used to evaluate the applicability of these interventions in a variety of settings and populations. Studies evaluated face-to-face interventions and were conducted in the U.S. and the United Kindom; in urban and rural, mostly household, settings; and included African-American, white, Native American, and Asian, but not Hispanic populations. Findings should generally apply to both tailored and untailored interventions across a range of populations, provided the interventions are adapted to the target population and delivery context. The body of evidence was not large enough to ascertain which individuals benefit from tailored interventions.

**Economic efficiency.** No studies were found meeting inclusion criteria for review of the economic efficiency of one-on-one education in increasing cervical cancer screening.

## Colorectal Cancer

**Effectiveness.** Two studies[77,78] were identified that reported using one-on-one education to increase colorectal cancer screening by guaiac-based FOBT. Each study qualified for review with greatest design suitability and fair quality of execution. One study[78] evaluated a tailored intervention.

Studies evaluated completed FOBT screening following either face-to-face education during routine office visits[77] or telephone follow-up by specially trained interventionists after FOBT kits were mailed to clients due for testing.[78] One study included two intervention arms evaluating separate untailored interventions (6.6 and 12.9 percentage point changes, both $p>0.05$),[77] and the other evaluated a tailored intervention (20.7 percentage point change, $p<0.05$).[78] Because overall quality of execution was not sufficient to support findings from only two studies, there is insufficient evidence to determine the effectiveness of one-on-one education in increasing colorectal cancer screening by FOBT.

Because intervention effectiveness was not established, the general applicability of one-on-one education in colorectal cancer screening was not addressed, nor was a search made for evidence of economic efficiency.

## Conclusions About One-on-One Education

According to *Community Guide* methods,[16] there is strong evidence that one-on-one education increases breast and cervical cancer screening by mammography and Pap test, respectively. These findings, for both tailored and untailored interventions, should apply

across a broad range of settings and populations, provided the interventions are adapted to the target populations and delivery contexts. Although there is some evidence that tailoring enhances effectiveness of one-on-one education in breast cancer screening, the evidence for any difference between tailored and untailored approaches in cervical cancer screening is limited. Moreover, for both breast and cervical cancer screening, evidence was too limited to ascertain which individuals benefit from tailored interventions. Evidence is insufficient to determine the effectiveness of one-on-one education in increasing colorectal cancer screening, because too few studies, with methodologic limitations (FOBT), or no studies (flexible sigmoidoscopy, colonoscopy, or double contrast barium enema) were found.

### Other Positive or Negative Effects of Interventions to Increase Community Demand

No reports were found of other positive or negative effects of interventions to increase community demand for breast, cervical, or colorectal cancer screening services on use of other healthcare services (e.g., blood pressure monitoring or adult immunization) or health behaviors (e.g., on smoking or physical activity) or on informed decision making (e.g., in reducing patient autonomy by offering incentives).

### Potential Barriers to Implementing Interventions to Increase Community Demand

Limited resources and infrastructure constitute the primary barriers to implementing interventions to increase community demand for breast, cervical, and colorectal cancer screening services. Healthcare delivery systems with limited computer or staffing support may have difficulty tracking, identifying, and notifying clients eligible for reminders or recall. Cost may be a major barrier to obtaining adequate exposure, dose, intensity, and quality of mass media campaigns. Access to effective marketing strategies, educational messages, and instructional materials (particularly for specific subgroups)—key components of mass media, small media, group education, and one-on-one education interventions—may be limited by cost and special skills required to develop and test these messages. Production and dissemination of tailored messages (small media, one-on-one education, and client reminders) may be more costly and resource intensive than untailored programs because tailoring generally requires new data collection (although electronic or other medical records could be used for some simple tailoring algorithms), development of extensive message libraries with graphics, and computer programming support to ensure appropriate individualization. Cost effectiveness can improve, however, through economies of scale. In addition, materials libraries (such as those available at the Cancer Control PLANET, http://cancercontrolplanet.cancer.gov) are a potential source of high quality, topic- and population-specific messages developed as components of evidence-based programs that many investigators and public health educators are willing to share.

One additional challenge in implementing existing tailored interventions in community-based settings is that the diverse computer programs and computer platforms upon which tailoring algorithms have been developed and implemented may not be easily adaptable to a specific community need or healthcare delivery context. However, as more individuals are able to link to and make use of the Internet, web-based tailored intervention programs may provide a good solution to both the cost and complexity of developing and delivering tailored interventions to promote cancer screening. Finally, recruitment training, and support of community health workers and other interventionists to deliver client reminders and educational messages, including tailored messages, may pose significant barriers in smaller community or free-standing clinical settings. Regional or other aggregations of populations and services might be considered as strategies to overcome this problem.

### Research Issues for Increasing Community Demand for Screening

For the six intervention approaches, the team identified key research issues that had not been answered in the review. Researchers are encouraged to consider which of these questions might be answered as part of studies already underway, through studies being planned, or through new studies. Research questions are grouped within each of the two effectiveness ratings (i.e., effective based on strong or sufficient evidence or undetermined based on insufficient evidence).

#### Interventions Shown to Be Effective

**Additional evidence of effectiveness.** These reviews demonstrated that three interventions to enhance community demand for breast, cervical, and colorectal cancer screening—client reminders, small media, and one-one-one education—are effective (strong or sufficient evidence) in increasing screening rates for one or more of these cancer sites. However, several important general and specific questions about effectiveness remain.

**General:**

- How does the effectiveness of interventions to increase community demand for screening vary with

the health literacy of a target population or subpopulation?
- How can newer methods of communication—including automated telephone calls and Internet-delivered applications—be used to improve delivery, acceptance, and effectiveness of these interventions?
- How effective are these interventions in increasing screening by colorectal endoscopy or by double contrast barium enema (for which no qualifying studies were identified)?
- What is required to disseminate and implement effective interventions in community settings across the U.S.?
- How can or should these approaches be applied to assure that screening, once initiated, is maintained at recommended intervals?
- With respect to interventions that may be tailored to individuals, how are effective tailoring programs adapted, disseminated, and implemented in community-based settings across the U.S.?

**Client reminders (effective in increasing breast, cervical, and colorectal [FOBT only] cancer screening):**

- Does effectiveness of client reminders for cervical and colorectal cancer screening vary with use of supplemental components, such as follow-up printed materials, telephone calls, or scheduling assistance intended to overcome barriers to screening?
- Can client reminders be adapted or used in conjunction with techniques to reach people who have never been screened for breast, cervical, or colorectal cancer or who may be hard to reach for screening?
- What is the comparative cost effectiveness of tailored versus untailored client reminder messages?

**Small media (effective in increasing breast, cervical and colorectal [FOBT only] cancer screening):**

- Does effectiveness of small media differ by choice of medium (e.g., letter, video, brochure, or Internet-delivered application), information source (e.g., personal physician, educator), or intensity or frequency of delivery?
- What is the relative cost effectiveness of tailored versus untailored messages?

**One-on-one education (effective in increasing breast and cervical cancer screening only):**

- What are the minimal and optimal duration, dose, and intensity requirements for one-on-one educational approaches to be effective?

**Evidence of applicability.** Interventions found to be effective by the Task Force were generally examined in broad population segments. However, questions may remain about their effectiveness in certain settings or for some populations and population subgroups. It is not practical, nor should it be assumed necessary, to conduct intervention trials in every setting or with every potential subgroup that might be reached, although science will benefit from the accumulation of such evaluation data.[2] At the same time, several key questions about applicability require attention.

- How effective are these interventions in populations that already have relatively high screening rates?
- Are these interventions effective in populations historically characterized as hard to reach for screening? If not, can they be adapted to such populations?
- With respect to tailoring small media, one-on-one education, or client reminders sent to individuals:
  - Does the increased initial cost of developing tailored interventions (including the data collection required) versus untailored ones justify tailoring in promoting cancer screening tests for all screening procedures and for all population groups? Are there economies of scale that might make these interventions cost effective when used in particular settings, such as large HMOs?
  - Do style, content, format, and depth of tailoring affect reception, comprehension, and response to messages and interventions? Although some studies have been conducted to assess one or more of these characteristics, not enough data were available to answer these questions for interventions reviewed here.

**Evidence of economic efficiency.** Efforts by researchers to provide complete and detailed economic information using standard approaches will enhance the overall value of their contributions and will improve interpretability of cost effectiveness across studies and across intervention options. Because of the small number of studies and their methodologic differences, the reported cost-effectiveness data may not, at this stage, provide sufficient guidance to decision makers in helping them choose a specific option among a menu of interventions. To develop a sound basis for comparative economic analyses of cancer screening interventions, future research should consider:

- documenting all cost and effectiveness data elements to enable future sharing and evaluation of cost-effectiveness for these interventions;
- clarifying study perspective (i.e., program, client, insurance company, societal) and itemizing costs relevant to that perspective (i.e., direct, fixed, other indirect);
- eliminating from analysis any costs not related to the intervention to enhance screening uptake (e.g., costs of actual screening tests, diagnosis-related procedures, follow-up treatment); and
- including costs of all intervention components in multicomponent interventions and, where possible,

separating effects of individual components from overall intervention effectiveness.

Finally, questions remain about the value to program planners of cost effectiveness in achieving intermediate outcomes (e.g., additional completed screening) rather than the health outcome ultimately desired (e.g., abnormal tests detected, life years saved). Further efforts, such as collection of data to estimate numbers of cases of cancer prevented or detected earlier, resulting from the additional completed screening, and measuring subsequent improvement in both quality and quantity of life, are also needed to translate cost effectiveness of screening into cost effectiveness of achieving ultimate health goals.

**Evidence of other positive or negative effects.** Questions concerning whether interventions to increase community demand for cancer screening result in other changes in health behavior or use of other healthcare services (e.g., blood pressure control or adult immunization) could be included in future cancer screening intervention research.

**Evidence for barriers to implementation.** Additional research is needed to find solutions to barriers that prevent or limit access to effective interventions, to messages, or to resources for producing and disseminating tailored messages. Research and other inquiry into methods for centralizing and cataloging intervention messages, both tailored and untailored, potentially could provide avenues of sharing and dialogue and make dissemination and implementation more feasible.

### Interventions for Which Effectiveness Is Undetermined

Effectiveness of client incentives (alone), mass media (alone), and group education has not been established for breast, cervical, or colorectal cancer screening. Remaining research questions in these areas include the following:

- Are these interventions potentially effective in increasing screening of these cancer sites?
- Are some incentives (e.g., ones of greater cash value or of greater appeal) more effective than others?
- Do these interventions result in other positive or negative changes in healthcare services (e.g., blood pressure monitoring or adult immunization) or health behaviors (e.g., smoking or physical activity)? Could incentives become a barrier to developing routine recommended screening practices or reduce patient autonomy in decision making?

Given the inherent expense of mass media interventions and costs already expended in efforts to answer remaining questions, it may be prudent to seek answers in lessons gleaned from studies of other health topics.

- What separate effects, if any, do mass media and other major components contribute to overall effectiveness of multicomponent media approaches to increase screening for breast, cervical, and colorectal cancers?
- What are the minimal and optimal component duration, dose, and intensity requirements for these approaches to be effective?
- Does effectiveness differ by mass media channel (e.g., TV, radio, billboard) for a given population or setting?
- What combinations of mass media and other interventions are optimal to increase a given cancer screening behavior or to reach particular target groups, such as low-income, ethnic, or minority populations?

It has been difficult to generalize about the effectiveness of group education because of the variety of groups, settings, educators, and styles. Yet despite insufficient evidence of overall effectiveness, group education could be effective among selected subsets of the population, in certain settings, or under certain conditions. Thus, we encourage researchers to address additional basic questions that carefully examine specific elements of group education and target populations. We also encourage voluntary health organizations and public health agencies that remain committed to group education to collect additional evaluation data, where possible, to assess such programs as practiced.

- Is group education more effective in some settings than in others or when delivered in particular formats or by particular kinds of educators?
- Do some populations benefit more from group education than from other interventions?
- What are the minimal and optimal number, length, and intensity of group education sessions for intervention effectiveness and how does effectiveness vary by screening site and screening histories of populations?
- Are there optimal combinations of information and motivational content within group education interventions?
- Is group education effective when combined with other interventions, such as one-on-one education?
- What is the cost effectiveness of group education?

## Discussion

These reviews summarize the evidence base that supports Task Force recommendations[161] for interventions to increase community demand for breast, cervical, and colorectal cancer screening services. Interventions to increase community demand are strategically distinct from interventions to overcome barriers to access[13] or to encourage providers to deliver these services,[14] both of which have been reviewed separately. Demand-enhancing interventions concentrate on promoting awareness, knowledge,

and motivation among groups of eligible individuals, ranging from those who require only reminding or prompting to those who resist or have not yet considered screening. Such interventions may be particularly appropriate for groups that do not make regular visits to healthcare facilities where screening is recommended or offered, or for groups that lack knowledge or motivation to follow cancer screening recommendations. At the same time, demand-enhancing interventions cannot achieve potential effectiveness if services are not accessible. Thus, before specific interventions are chosen, selection of strategies must be considered in the context of local resources and conditions.

An important limitation of these reviews and the recommendations they support is that they do not offer specific guidance as to which intervention to select for a given population or setting, nor do they ensure the optimal success of recommended interventions under all circumstances. The choice of one or more recommended interventions is likely to be influenced by a number of different factors, including overall population screening rate, location and identity of populations in greatest need, opportunities to deliver specific interventions, and availability of tracking systems. For example, despite general success of client reminders in increasing rates of cancer screening and other preventive services,[19–23] they may not be the approach of choice in communities where cancer screening rates are relatively high among those enrolled in healthcare programs but where identifiable pockets of under-users require more targeted or intensive efforts to be educated and motivated. Similarly, when community screening rates are relatively high, as may be the case for cervical cancer,[4] interventions that involve costly mass media or other delivery systems for widespread coverage may not be optimal for reaching the relatively small proportion of women who have never been screened or are not getting screened on recommended schedules. On the other hand, large scale community-wide interventions may be the appropriate choice when screening rates are relatively low in the general population, as in the case of colorectal cancer screening. Making "the right" selection will rely, to a large degree, on knowledge about local context, culture, needs, screening history, and options for delivery. Any application of a recommended intervention will need to be adapted to specific target audiences and settings. Cancer Control PLANET (Plan, Link, Act, Network, with Evidence-based Tools, http://cancercontrolplanet.cancer.gov/) is an important resource for communities and organizations seeking to adopt and adapt evidence-based cancer screening interventions. Its links provide helpful sources of information for determining cancer control program priorities, identifying potential partners, exploring different intervention approaches, finding and adapting research-tested intervention programs and products, and planning and evaluating the intervention program.

Two additional limitations of these reviews have each been addressed in the Research Issues (above). One is that they offer little insight into the applicability of the approaches among specific populations who have in the past been particularly hard to reach for screening. Few studies specifically addressed effectiveness by screening history or by social or economic status or, with the exception of client reminders, noted how effectiveness can be enhanced. There is, however, consensus that higher intensity delivery, content, or components, including use of more personalized approaches, may be necessary to influence those who are less ready to comply with recommended cancer screening tests.

The other limitation is that available studies generally restricted their focus to post-intervention changes in screening behavior over limited time frames and do not deal with maintenance of screening at recommended intervals or ways to optimize effective interventions to sustain screening behaviors, once initiated.[5,6]

These reviews and the accompanying evidence-based Task Force recommendations[161] should be useful in identifying and selecting options for cancer screening promotion interventions when increasing community demand for these services is indicated. Moreover, research questions provided in this article help to identify important gaps in our knowledge base and should be used to guide future research, both in determining research priorities and in allocating research funds.

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