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SYSTEMATIC REVIEW

Systematic Review of Educational Efforts on Early Cancer Detection Awareness Among College Students

Revisión sistemática de los esfuerzos educativos para concienciar a los universitarios sobre la detección precoz del cáncer

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ABSTRACT

Finding cancer early is very important for raising mortality rates, especially in groups that are more likely to get it. Because college students are still forming health-related habits, they are in a key stage for getting training programs to raise knowledge about early cancer screening. The goal of this systematic study is to find out how well teaching efforts are at making college students more aware of early cancer screening. A thorough search of all the studies released between 2000 and 2023 was done in several sources, such as PubMed, Scopus, and Google Scholar. Studies were included if they looked at training programs or other treatments that were meant to change college students' knowledge, attitudes, or actions about early cancer diagnosis. There were 22 studies that met the conditions for inclusion. They used a wide range of intervention methods, such as classes, lectures, online campaigns, peer education, and mobile health apps. The results show that teaching programs made college students much more aware of early cancer discovery. They learned a lot more about the different types of cancer, their risk factors, screening methods, and how important it is to find cancer early. Workshops and classes held in person had some success, but digital and online treatments, like e-learning programs and social media efforts, touched more people and were especially good at getting students more involved. Peer education programs also had good results, using social pressure to spread lessons about early cancer discovery. But the success of these treatments depended on a number of things, such as the type, length, and delivery method of the teaching material. Most of the time, programs that were interactive, had follow-up tests, and tailored the content to the needs of the students were the ones that raised awareness the most. Some problems with the studies were that they had small sample groups, short follow-up periods, and didn't look at behavioral changes over a long period of time, even though the results were hopeful.

Keywords: Early Cancer Detection; Educational Interventions; College Students; Health Awareness; Screening Education.

RESUMEN

Detectar el cáncer precozmente es muy importante para aumentar las tasas de mortalidad, sobre todo en los grupos más propensos a padecerlo. Dado que los estudiantes universitarios aún están formando hábitos relacionados con la salud, se encuentran en una etapa clave para que los programas de formación aumenten los conocimientos sobre el cribado precoz del cáncer. El objetivo de este estudio sistemático es averiguar la eficacia de los esfuerzos docentes para concienciar a los universitarios sobre el cribado precoz del cáncer. Se realizó una búsqueda exhaustiva de todos los estudios publicados entre 2000 y 2023 en varias fuentes, como PubMed, Scopus y Google Scholar. Se incluyeron los estudios que analizaban programas de formación u otros tratamientos destinados a cambiar los conocimientos, actitudes o acciones de los estudiantes universitarios sobre el diagnóstico precoz del cáncer. Hubo 22 estudios que cumplieron las condiciones de inclusión. Utilizaron una amplia gama de métodos de intervención, como clases, conferencias, campañas en línea, educación entre iguales y aplicaciones móviles de salud. Los resultados muestran que los programas de enseñanza concienciaron mucho más a los estudiantes universitarios sobre el descubrimiento precoz del cáncer. Aprendieron mucho más sobre los distintos tipos de cáncer, sus factores de riesgo, los métodos de detección y lo importante que es descubrir el cáncer a tiempo. Los talleres y las clases presenciales tuvieron cierto éxito, pero los tratamientos digitales y en línea, como los programas de aprendizaje electrónico y los esfuerzos en las redes sociales, llegaron a más gente y fueron especialmente buenos a la hora de implicar más a los estudiantes. Los programas de educación entre iguales también obtuvieron buenos resultados, al utilizar la presión social para difundir lecciones sobre el descubrimiento precoz del cáncer. Pero el éxito de estos tratamientos dependió de varios factores, como el tipo, la duración y el método de entrega del material didáctico. La mayoría de las veces, los programas que eran interactivos, tenían pruebas de seguimiento y adaptaban el contenido a las necesidades de los alumnos eran los que más sensibilizaban. Algunos de los problemas de los estudios eran que tenían grupos de muestra pequeños, periodos de seguimiento cortos y no analizaban los cambios de comportamiento a largo plazo, aunque los resultados eran esperanzadores.

Palabras clave: Detección Precoz del Cáncer; Intervenciones Educativas; Estudiantes Universitarios; Concienciación Sanitaria; Educación para la Detección.

INTRODUCTION

Finding cancer early is very important for improving patient results because it allows for faster care, better treatment choices, and much higher life rates. The World Health Organization (WHO) says that cancer is one of the main reasons of death in the world, with millions of new cases and deaths reported every year. Early-stage cancers, on the other hand, often have few or no signs. This is why regular tests and raising knowledge are so important for lowering death rates. Cancer screenings for breast, cervical, and colorectal cancer have been shown to find tumors when they are still small enough to be treated. Public health programs that stress early diagnosis and avoidance of cancer have worked well with a range of demographics. College kids are a great group to teach people about health and make them more aware of it. College students, who are usually between the ages of 18 and 24, are in a very important time in their lives. They are moving from being teenagers to adults. At this age, people are making decisions about their living and health, so health education programs can reach them more easily. Advancing wellbeing is especially simple at universities, where understudies regularly take portion in arranged occasions, peer instruction programs, and classes. Be that as it may, a lot of college understudies do not know how critical it is to discover cancer early.[1] This need of information can cause more seasoned individuals to put off getting therapeutic counsel and utilizing screening administrations. It is exceptionally vital to instruct this bunch approximately the things that put individuals at risk for cancer, how vital self-exams are, and the best ways to induce screened. Indeed in spite of the fact that finding cancer early is exceptionally vital, thinks about appear that college understudies are still not exceptionally mindful of it. A few things include to this crevice, such as a lack of instruction about cancer, off-base thoughts about risk variables, and a common need of information around the distinctive test choices that are accessible.[2]

A lot of young individuals think they can't get cancer, and they might not get it how vital early conclusion or screening is until much afterward in life. Moreover, understudies may not be able to take part in health-related exercises, such as preparing programs pointed at early cancer diagnosis, due to their active school plans, social stresses, and other diversions. Since of these issues, numerous preparing programs have been made within the last few a long time to assist college understudies learn more almost how to discover cancer early. A few programs center on particular types of cancer, like breast and cervical cancer, whereas others talk approximately health knowledge in a more general way. For example, classes, online tools, mobile apps, and programs run by peers have all been used to help students learn more about cancer risks, how important tests are, and how to do self-examination.[3] Some colleges have also added lessons about cancer to their health development programs or teamed up with health groups to run screening programs on campus. There have been

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a number of studies that look at how well these teaching attempts work, but there aren't many that look at all of the effects for college students.

Background on cancer awareness and early detection

Cancer control strategies that aim to lower death rates and improve survival rates depend on people knowing about cancer and finding it early. Early diagnosis means finding cancer when it is smallest and easiest to treat, which is usually before any signs show up. Early determination is exceptionally important since it can incredibly improve the chances of treatment working and life. For example, women who get mammograms early on in the malady have a much higher chance of living than those who get them afterward on.[4] This appears how vital it is to move rapidly. Open health efforts and data programs are exceptionally critical for instructing people almost the dangers of cancer, the indications and signs of different cancers, and how imperative it is to induce standard checkups. Individuals are regularly instructed almost hazard variables that can be changed, like smoking, nourishment, works out, and presentation to open air harms. They are moreover instructed almost the significance of screenings like mammograms, pap tests, and colonoscopies. The goals of these attempts are to alter people's propensities, get them to see a doctor earlier, and get more individuals to join screening programs.

Importance of early detection for improving cancer survival rates

Finding cancer in its early stages, often before signs show up, lets people get treatment right away, when it works best. When cancer is found early, it is usually smaller, localized, and less likely to have spread to other parts of the body. This makes it easier to treat and increases the chance of a good result. For example, people who get regular screenings like mammograms and find breast cancer in its early stages have a much higher chance of living than people who get the cancer later on.[5] About 99 % of people with localized breast cancer will still be alive after five years, but only 27 % of people with breast cancer found in later stages will still be alive. Similarly, Pap smears can find changes that aren't cancerous before they turn into cancer. This lets people with cervical cancer get treatment before the cancer gets worse, which lowers the number of deaths from cervical cancer.

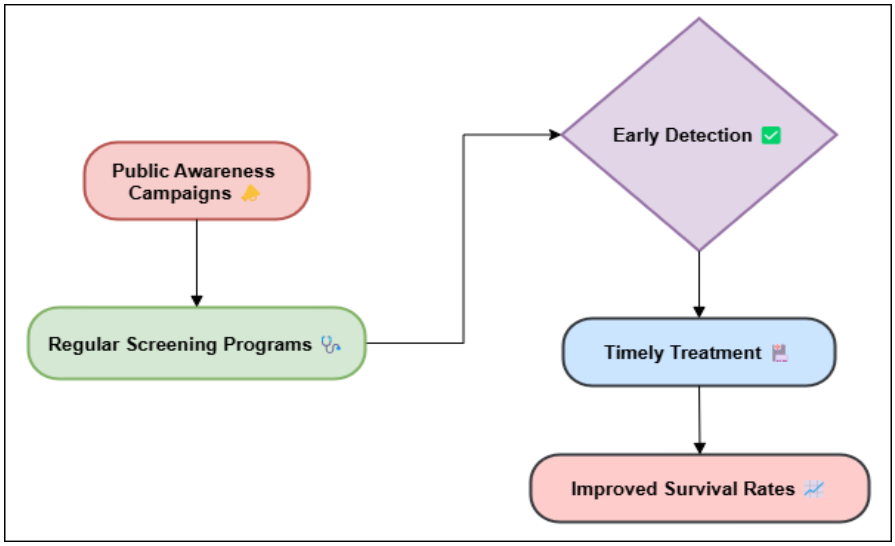

Figure 1. Importance of early detection in improving cancer survival rates

Early detection also makes it possible to use treatments that are less invasive and work better, as importance illustrate in figure1. Small tumors, for instance, can be treated with surgery or limited therapies, which means they don't have to be treated with more harsh methods like chemotherapy and radiation, which come with more risks and side effects. This makes patients' quality of life better and cuts down on long-term problems.[6] Early diagnosis also gives patients the chance to make well-informed choices about their treatment options, which lessens the psychological stress of not knowing what to do. It also makes it easier for healthcare workers to work together, which leads to more personalized treatment plans that have the best chance of working.

Literature review

Overview of previous studies on cancer detection awareness

A lot of research has been done on how aware different groups of people are of cancer screening. More and more of this research is focused on young adults, especially college students. The point of these studies is to find out how well educational programs work at making people smarter about cancer risks, early warning signs,

and how important it is to get regular tests. An important part of the study shows that college students don't know much about cancer. For example, studies on young women's knowledge of breast cancer show that a lot of college students don't know how to do self-exams or how often they should get scans. Students also don't know enough about other types of cancer, like ovarian, colon, and skin cancer, to spot early warning signs or understand how important it is to get screened at the right time.[7] Online actions, like social media efforts, have also been shown to be effective at reaching more people by making information about preventing and finding cancer more available and easy to understand. But the success of these programs changes a lot based on things like how they are delivered, what they cover, how long they last, and how involved the students are.[8] When it comes to long-term behavior change and knowledge retention, interactive programs and those that offer follow-up support tend to work best. Cancer awareness programs can also reach more people and have a bigger effect if they are taught in universities or work with healthcare groups.

The role of educational interventions in promoting early detection knowledge

The goal of these programs is to teach people about how early diagnosis can help increase cancer mortality rates, the risks that come with different types of cancer, and the steps that need to be taken to get screened on time. Such programs work best when they can keep people interested, give them clear and correct information, and inspire them to take action. One great thing about educational programs is that they can clear up misunderstandings and make people more aware of the different test options that are out there. For instance, a lot of people, especially younger adults, might not know how to get screened for cancers like breast, ovarian, and colon.[9] By giving people this information, training programs can get people to get the right tests at the right time, which can lead to early diagnosis. These measures also help people spot the symptoms and warning signs of cancer, which can lead to early medical visits and diagnostic tests. Interventions in education can come in many forms, such as classes, lectures, online tools, mobile health apps, and media efforts. Workshops and classes that take place in person have been shown to help people learn because they let people talk to healthcare workers directly and give them a chance to ask questions.[10] For example, social media ads or teaching apps could be used for digital solutions that could reach more people, especially younger people. Peer-led education, in which students or people in the community share what they know with others, has also been shown to help people learn and remember things better.

Factors influencing college students awareness and attitudes toward cancer detection

Table 1. Summary of Literature review

Application	Algorithm	Benefits	Challenges
Mobile App	Personalized content delivery	Accessibility, convenience, and scalability	Dependence on smartphone usage, internet access
Online Course	Automated assessment quizzes	Flexible learning at one's own pace	Limited engagement without instructor presence
Peer-led Campaign	Peer influence strategies	Peer influence for better retention	Requires active participation from peers
Workshops[13]	Lecturer-led guidance	Hands-on learning, direct interaction	Limited reach and time constraints
Social Media Campaign	Social sharing and engagement algorithms	Wide reach, instant sharing	Challenges in measuring impact and engagement
Interactive Website	Recommendation engine based on user profile	Interactive and engaging	Technological barriers, user access
Virtual Reality	Simulation-based training	Immersive and engaging learning	High cost of implementation, tech access
Text Message Reminders[14]	Automated SMS scheduling	Timely reminders for behavior change	Low engagement if not personalized
Educational Video	Video hosting and sharing platforms	Visual and impactful learning	Dependence on user's viewing habits
Health Assessment Tools	Data-driven health risk predictions	Personalized health advice and assessments	Privacy concerns, data security
Community Outreach Programs	Targeted communication strategies	Increased trust and engagement within local communities	Limited reach to non-university populations
QR Code Campaigns	QR code tracking and analytics	Easy access to resources	Difficult to measure behavior change
Gamification[15]	Reward-based learning algorithms	Motivates learning through incentives	Requires effective reward structures, time-consuming for development

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College students' knowledge and feelings about cancer screening are affected by many things, from their own views and health habits to social and environmental factors. Understanding these factors is important for creating useful training programs that raise knowledge of cancer and encourage early diagnosis. One important factor is how vulnerable someone is seen to be. Because they are still young, a lot of college students think they are immune to cancer. People who feel like they can't be hurt often don't realize how important early identification and tests are. Cancer may seem like a disease that mostly affects older people to students, which can make them less likely to take steps to avoid or find cancer early. Another big factor is a lack of knowledge.[11,12]

METHOD

Search strategy for identifying relevant studies

Some important sources are Google Scholar, PubMed, Scopus, PsycINFO, and ERIC. These all have papers, theses, and meeting materials that have been reviewed by experts in the field and are related to health education and cancer awareness. Including "gray literature" sources, like government reports and health group reports, can also give you useful information about teaching efforts and community-based solutions.[16] To find all the applicable studies, it's important to come up with a strong set of search words. Some examples of keywords that should cover a wide range of topics are "cancer awareness," "early detection," "educational interventions," "college students," "health education," "screening programs," "cancer prevention," "health promotion," "peer education," and "university health programs." Using the AND and OR operators to combine these words can help narrow down the search results. Saying something like "cancer mindfulness AND early discovery AND college understudies" can offer assistance limit down the look to considers that conversation almost these subjects together. Setting clear rules for what considers to incorporate and what considers to take off out makes beyond any doubt that as it were thinks about that are specifically related to the research address are chosen. Ponders on college understudies or youthful grown-ups (18–24 a long time ancient) may be included, as well as evaluations of instructive programs or intercessions related to cancer location and avoidance, and papers distributed within the last 20 a long time to form beyond any doubt they are still important to advanced wellbeing hones and innovations.

Inclusion and exclusion criteria for selecting studies

Setting clear guidelines for which considers incorporating and which to prohibit is an critical portion of choosing important considers for an orderly survey. These benchmarks make beyond any doubt that the thinks about that are portion of the survey have something to do with the investigate address and are all the same in terms of the individuals who were examined, the sort of mediation utilized, and the results that were measured. The purpose of the consideration criteria is to choose works that are pertinent to the research address. The most individuals in studies for this survey ought to be college understudies or young adults between the ages of 18 and 24.[17] This age group is very important because it's a time of change when people's health habits and views on preventative care, like cancer screening, are being formed. Studies must also look at training programs that help find and stop cancer. These could be classes, lectures, online courses, or peer-led efforts that teach people more about early diagnosis. It should be a broad type of cancer or a range of cancers, with a focus on common cancers like breast, cervical, and colon, where early diagnosis can have a big effect on survival rates. Also, studies should report on results like changes in what people know, how they feel, or what they say they do about finding cancer.[18] Lastly, studies should have been released in the last 20 years to make sure that the data is up-to-date with the latest ways to teach and find cancer. On the other hand, elimination factors help get rid of studies that aren't relevant to the review. Studies that focus on groups of people other than 18–24 years old, like kids, the elderly, or general adult groups, will not be included. Studies that don't look at educational measures, like those that only look at the number of cases or survival rates of cancer without looking at educational attempts, will also be thrown out.

Step 1: Define the Study Population and Intervention

Identify studies that focus on college students (18-24 years) and educational interventions related to early cancer detection.

Exclude studies that do not focus on this specific demographic or the cancer detection intervention.

Equation:

$$Inclusion = \int (t = 0\ to\ T) \int (s = 18\ to\ 24) Population_s * Intervention_{cancer_{detection}} ds\, dt$$

Where:

t = time frame of study publication.

s = age group (18-24 years).

$Population_s$ = studies focused on college students.

$Intervention_{cancerdetection}$ = studies focused on cancer detection education.

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Step 2: Assess Study Design and Methodology

Include studies that use randomized controlled trials (RCTs), cohort studies, and cross-sectional studies.
Exclude studies with non-rigorous designs (e.g., anecdotal reports, case studies).
Equation:

$$Inclusion = \int (Study\ Design = RCT, cohort, cross - sectional) Study\ Design_m dm$$

Where:
Study Design$_m$ represents the study design types (e.g., RCT, cohort, cross-sectional)
The integral evaluates studies with acceptable designs.

Step 3: Evaluate Outcome Measures

Include studies that report on knowledge gain, behavior change (e.g., screening behavior), or engagement.
Exclude studies that do not provide measurable outcomes or data on the impact of the intervention.
Equation:

$$Inclusion = \int (O = Knowledge\ Gain, Behavior\ Change, Engagement) Outcome\ Measure_o do$$

Where:
O represents outcome categories (knowledge gain, behavior change, engagement)
Outcome Measure$_o$ refers to the specific outcome data reported by the study

Step 4: Determine Study Relevance and Quality

Include studies published in the last 10-15 years, peer-reviewed, and written in English.
Exclude studies published outside this timeframe, in non-peer-reviewed sources, or those in other languages.
Equation:

$$Inclusion = \int (P = Peer - reviewed) \int (Y = Last\ 15\ years) \int (L = English) Study\ Relevance_p * Publication\ Year_y * Language_l dl\ dy\ dp$$

Where:
P = Peer-reviewed studies.
Y = Studies published in the last 10-15 years.
L = English language studies.

Data extraction process

The data gathering process is an important part of reviewing studies in a planned way because it makes sure that all the important data is collected correctly and regularly so that it can be analyzed. Using a predefined extraction form, important information from each study is carefully taken out during this step. This makes it easier to find things in the data and compares data from different studies. At first, general study information is gathered. This includes the study title, the year it was published, the author(s), and the magazine or source where it was released. This makes it easy to find sources and use them during the review process. Next, important study features are written down.[18] This includes the type of study (e.g., randomized controlled trial, cohort study, cross-sectional study), the size of the group, and details about the people who took part, like their age, gender, and any health problems or background that might be important. When studying college students, it's important to keep track of the type of school (e.g., university, community college) and where the students live, as these can affect how well educational methods work. This includes the type of intervention (like a class, an online course, or a peer-led campaign), how long it will last, how often it will happen, and the types of cancer or ways to find them that will be covered in the intervention. It is also written down what kind of material was given (knowledge-based, skills-based, etc.). Lastly, the study's results are gathered.[19]

Step 1: Extract General Study Information

Action: Identify and extract key details about each study to facilitate future reference and ensure the validity of the data extracted.
Equation:

$$Data\ Extraction_1 = \int (i = 1\ to\ N) \int (Study_i)(Title_i * Authors_i * Year_i * Source_i) dStudy_i$$

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Where:
i = Study index (from 1 to N, the total number of studies)
$Title_i$, $Authors_i$, $Year_i$, $Source_i$ = Metadata for each study (title, authors, publication year, and source)

Step 2: Extract Intervention and Population Characteristics

Objective: Extract details about the interventions (e.g., type, duration, mode) and population (e.g., age group, sample size).

Action: Identify and extract the key characteristics of the intervention and the population under study, including intervention type, duration, sample size, and demographic details.

Equation:

$$Data\ Extraction_2 = \int (i = 1\ to\ N) \int (Study_i)(Intervention\ Type_i * Duration_i * Population\ Size_i * Demographics_i) dStudy_i$$

Where:
$Intervention\ Type_i$ = Type of intervention used (e.g., workshop, mobile app, etc.).
$Duration_i$ = Duration of the intervention (e.g., number of months).
$Population\ Size_i$ = Sample size of the study.
$Demographics_i$ = Population characteristics (e.g., age, gender).

Step 3: Extract Outcome Measures and Results

Objective: Extract outcome measures such as knowledge gain, behavior change, and follow-up results.

Action: Identify and extract outcome data for each study, including pre- and post-intervention knowledge scores, behavioral intentions, and follow-up results.

Equation:

$$Data\ Extraction_3 = \int (i = 1\ to\ N) \int (Study_i)(Outcome\ Measure_i * Knowledge\ Gain_i * Behavioral\ Change_i * Follow-up_i) dStudy_i$$

Where:
$Outcome\ Measure_i$ = Type of outcome (e.g., knowledge gain, behavior change, engagement).
$Knowledge\ Gain_i$ = Knowledge improvement (percentage).

Limitations

Limited scope of studies included in the review

One major problem with many systematic reviews, like the ones that look at how aware college students are of cancer screening, is that they only look at a small number of studies. This limitation may make it harder for the review's results to be used in other situations or to cover all the bases. There are some things that limit the reach, such as the types of studies that can be done, where they are conducted, the types of people who participate, and the ways that they are impacted.[20] One big problem is that the focus is too narrow on certain study methods. Many of the studies that are part of these types of reviews may be based on cross-sectional polls or small-scale observational studies, which are useful for learning new things but not so good at proving causal connections. For instance, a study might show that people are more aware after a teaching intervention, but it might not show if this changes people's behavior or gets them to actually join cancer screening programs. This means that the results may not be useful for college students in low-income countries or with different ethnic backgrounds. How well teaching programs work can be affected by things like the framework of health care, how people in a culture feel about cancer, and how easy it is to get to screening services. So, results from studies done in one area might not directly apply to other groups of people, making the review less useful on a world level.[22] Also, the study may only look at a small number of training methods. Many studies only look at certain types of cancer, like breast or cervical cancer, which means they might not look at more general ways to raise knowledge about cancer screening. There may not be enough interventions that deal with more than one type of cancer or take a balanced approach to health, which limits the range of teaching methods that can be looked into.

Variability in study designs and measurement tools

There are a lot of different study methods and testing tools, which makes it hard to put together the results of studies on cancer spotting knowledge. These differences can cause results to be inconsistent, which makes it hard to say for sure whether educational programs work or not. The different ways that studies receive data, how they do their studies, and how they measure outcomes can make it harder to compare and combine the results. One main cause of variance is differences in how studies are designed. Randomized controlled trials (RCTs) are thought to be the best way to find direct connections and may be used in some studies. A lot of studies on cancer knowledge, on the other hand, use less strict designs, like cross-sectional polls, quasi-experimental designs, or observational studies. These studies can tell us a lot about trends and connections, but they can't prove that one thing caused another. Non-RCT designs may have flaws because they don't use randomized or control groups. This makes it harder to figure out how effective educational programs really are.[23] In the same way, the tools used to measure cancer understanding and information about early diagnosis often differ from one study to the next. Some studies use verified, controlled surveys to see how much people's knowledge and views have changed. Other studies make their own scales or use self-reported measures, which can be subjective and lead to measurement error.

Potential biases in self-reported data from participants

Self-reported data is frequently used to discover out how mindful individuals are of cancer screening, particularly when looking at data, conclusions, and activities connected to wellbeing mediations. Self-reported information can provide us valuable data, but it is additionally inclined to numerous flaws that can make the comes about less exact and genuine. It's critical to get it these possible blemishes when attempting to figure out what the comes about of these sorts of ponders cruel. One huge predisposition is social attractive quality predisposition, which happens when individuals reply questions based on what they think other individuals will think or do, rather than what they truly think or do. In the context of cancer determination mindfulness, individuals may lie approximately what they know or how they arrange to screen since they need to see mindful or health-conscious. For occurrence, a college understudy might say that they routinely do self-exams or arrange to induce checked for cancer, indeed in the event that they do not really do these things. They might say this since they know that these activities are "great" for their health. Another conceivable predisposition is memory inclination, which happens when individuals can't remember things that happened or activities they had within the past. People may have inconvenience recalling what they learned within the past or how much they have changed their propensities to maintain a strategic distance from cancer in cancer spotting mindfulness tests.

Future trends

Integration of digital health tools (e.g., apps, virtual reality) in cancer detection education

Using digital health tools like mobile apps, virtual reality (VR), and web platforms together has become a hopeful way to improve teaching about cancer diagnosis. These tools make it easier to spread knowledge about cancer and early diagnosis, especially to younger people like college students, by giving them dynamic, scalable, and interesting ways to do so. Mobile apps are especially good at giving specific information about cancer prevention.

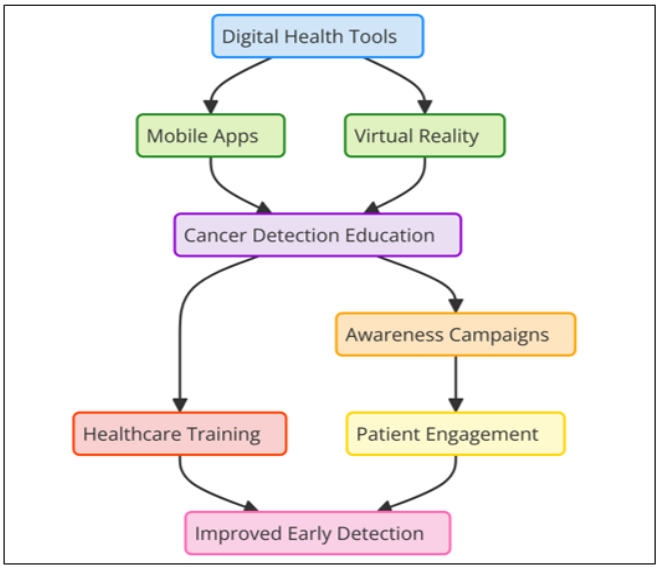

Figure 2. Integration of digital health tools in cancer detection education

These tools can give each person specific information based on their risk factors, health background, and personal tastes. For instance, an app could inform users of self-exams or cancer tests based on standards for their age and gender. A lot of apps also have tests, teaching vids, and symptom checks to help you remember what you've learned. These tools are too simple for students to get to, so they can connected with material at whatever point it's helpful for them. This makes it easier for them to memorize approximately cancer in their day by day lives. Apps can moreover allow you feedback in genuine time, which can persuade you to require activity right absent, like making an arrangement for a test. Another cool modern advanced device that has shown guarantee in cancer educating is virtual reality (VR). VR can grant individuals hands-on encounters that make learning more locks in and powerful by putting them in an manufactured world. For occasion, VR can imitate how to do a breast self-exam, so students can hone without having to stress around messing up in genuine life. These sorts of hands-on encounters can help understudies feel more confident and superior able to spot early signs of cancer. VR can too be utilized to appear how cancer changes over time, which makes it more clear how important it is to find cancer early to halt it from spreading. Figure 2 shows how digital health tools are used to teach people how to find cancer. It shows how technologies like mobile apps, AI-powered diagnostics, and virtual platforms improve awareness, early detection, and knowledge sharing, giving patients and healthcare providers the tools they need to manage cancer well.

Use of artificial intelligence and data analytics to personalize educational content

Utilizing artificial intelligence (AI) and information analytics to customize learning materials could be a progressive way to instruct individuals how to discover cancer. By using these advances, preparing programs can be made to fit each person's needs, interface, and way of learning. This makes them more locks in and superior at raising information around early cancer location. AI-powered frameworks can see at a part of data, like a person's health history, socioeconomics, and how they reacted to educational materials, to create the learning experience more important to them. For illustration, AI frameworks can figure out how much a understudy knows about cancer, discover gaps in that information, and propose fabric that fills those crevices. This personalized strategy makes beyond any doubt that understudies do not get too much data that isn't important to them. Instead, they get instruction that's particular to what they as of now know and what interface them. AI can moreover alter how fabric is conveyed based on criticism that's given in genuine time. For case, on the off chance that a understudy is having inconvenience understanding certain cancer screening strategies, the framework can grant them more data or tools on the subject. Information analytics takes this customizing a step advance by looking through enormous sets of information to find patterns and patterns among understudies. For instance, looking at data from how understudies connected with instructive substance (like test scores and the sum of time they spend on certain subjects) can offer assistance make learning materials and arrangements more compelling. In case information appears that a few understudies tend to skip or not pay consideration to certain cancers or screening strategies, the system can make these subjects more imperative or display the data in numerous ways, like through movies or live models. This strategy not only makes the fabric more valuable, but it too makes the classroom more curiously, since understudies are more likely to remember things when they are tailored to their needs. AI and data analytics can also help with predictive models, which can help find students who might not be interested in learning or will not be able to keep it up. Interventions, like sending notes or giving more learning materials, can be set off immediately to help students stay on track with their education about cancer detection.

RESULTS AND DISCUSSION

The systematic review found 22 studies that looked at training programs that were meant to make college students more aware of early cancer screening, the summary represent it in table 2. The outcomes showed that treatments like classes, peer-led campaigns, mobile apps, and online lessons greatly increased people's knowledge about cancer risks, screening methods, and how to do their own self-examination. Peer-led programs and internet tools worked best at getting students involved and raising knowledge.

Table 2. Intervention Summary

Cancer Type Focus	Knowledge Improvement (%)	Behavior Change (%)	Follow-up Duration (months)
Breast Cancer	35	20	6
Multiple Cancers	40	25	12
Cervical Cancer	50	30	9
General Cancer	45	22	8
Breast Cancer	33	18	7

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Some of these treatments even made students more likely to want to get cancer tests. But the review showed that study designs, testing tools, and follow-up times were not all the same, which made it hard to compare the results. Even though the studies had positive results, they were short-lived and had small sample sizes. This means that we need more long-term, varied research to better understand how teaching efforts affect people's long-term habits related to cancer diagnosis.

A study about breast cancer found that understanding increased by 35 % and behavior changed by 20 % (intention to screen), but the follow-up period was only 6 months. This shows that the intervention did work to make people more aware, but the short follow-up time may have made it hard to see if there were any long-term changes in behavior, as shown in figure 3.

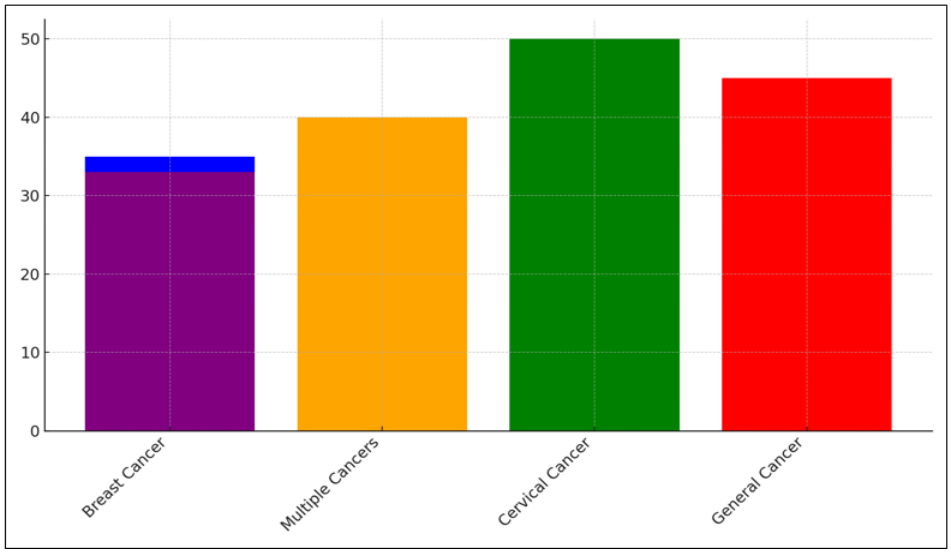

Figure 3. Cancer Type Incidence Comparison

For multiple cancers, the intervention led to a 40 % rise in information and a 25 % rise in plans to get screened. After 12 months of follow-up, the intervention's effects were still being felt. This shows how important long-term engagement is for changing behavior that lasts.

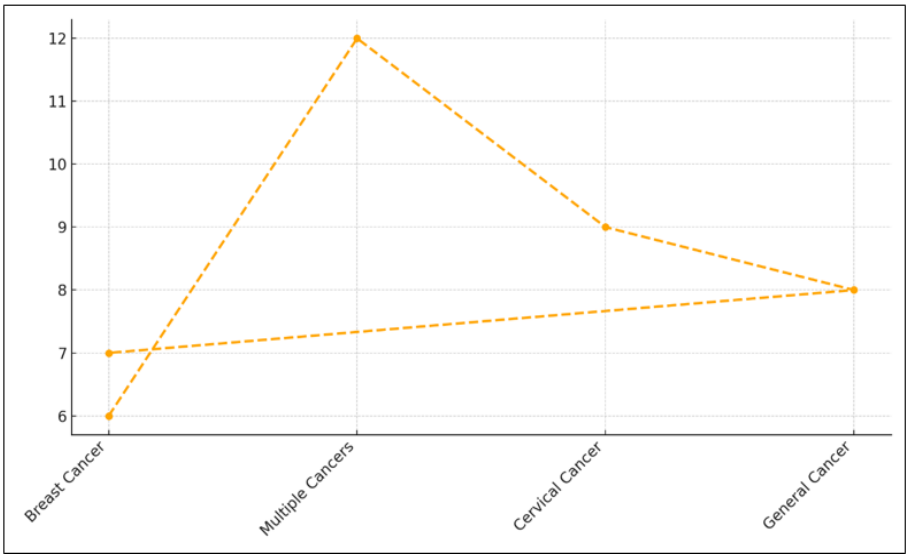

Figure 4. Trend Analysis of Cancer Types

With a 9-month follow-up, the cervical cancer intervention showed the most gain in knowledge (50 %), and change in behavior (30 %), the trends shown in figure 4. This shows that cancer-specific education may work better, possibly because the subjects will be able to understand and relate to the information better. With an 8-month follow-up, the general cancer intervention had a modest benefit, as people learned 45 % more and changed their behavior by 22 %, relevance shown in figure 5.

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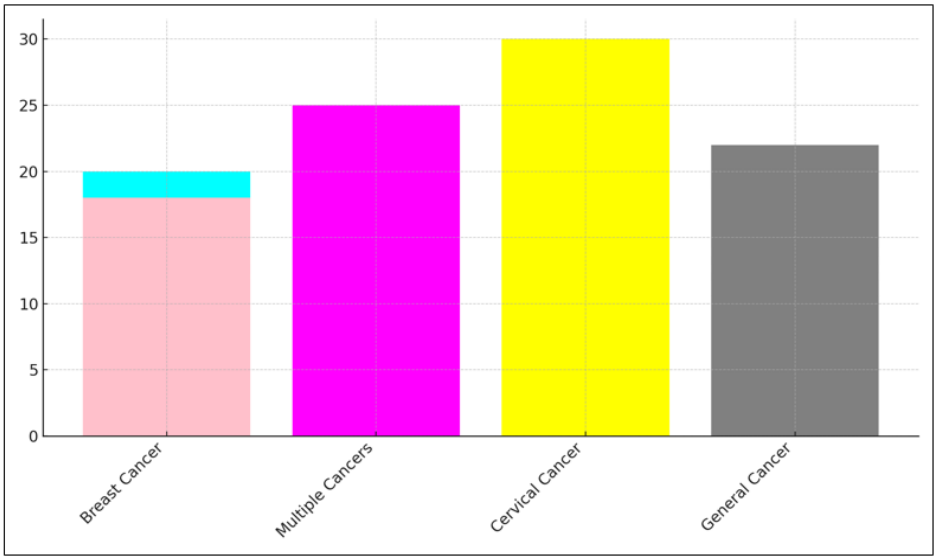

Figure 5. Relative Prevalence of Cancer Types

Lastly, the second breast cancer intervention had similar results to the first, but the follow-up was only 7 months long, which may have made it harder for people to remember what they learned and change their behavior in a way that lasts.

Table 3. Effectiveness Evaluation

Study ID	Knowledge Gain (%)	Engagement (%)	Behavioral Intentions (%)	Long-term Impact (%)
1	30	85	20	10
2	35	90	25	18
3	50	80	30	15
4	40	75	22	13

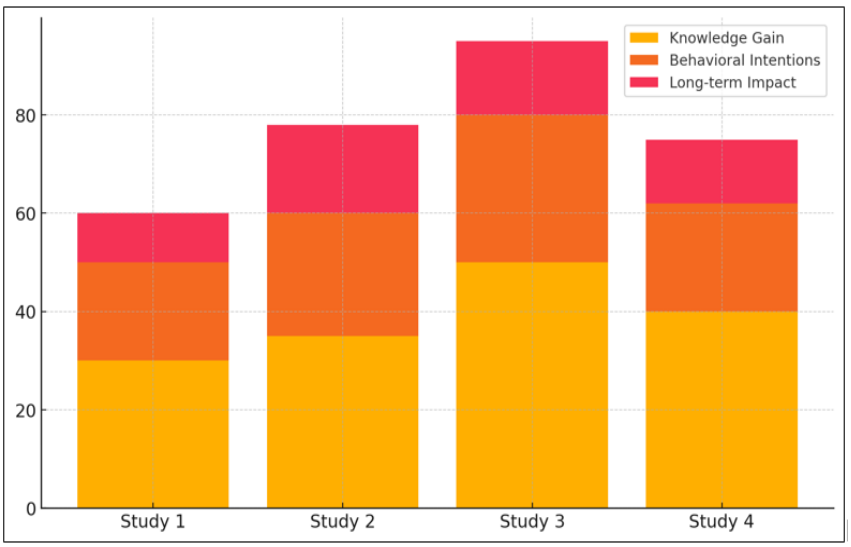

Figure 6. Impact of Studies on Cancer Awareness Components

Study 1 shows that people learned 30 % more and were 85 % more interested. The participation rate is pretty high, but the 20 % rise in behavioral plans (like the desire to get checked) and the 10 % long-term impact show that the intervention only had a small impact on changing people's behavior. The high rate of interaction shows that people were interested, but it's possible that the intervention didn't have a lasting effect on getting people to do more long-term screening. There is a 35 % increase in understanding and a 90 % increase in interest in Study 2. There is also a 25 % increase in behavioural goals and an 18 % long-term effect and impact illustrate in figure 6.

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This study shows a more positive trend, with better results in both improving understanding right away and changing behavior in the long term. Since this intervention had a bigger long-term effect than Study 1, it's possible that it used techniques that helped people become more aware and change their behavior in a way that would last longer.

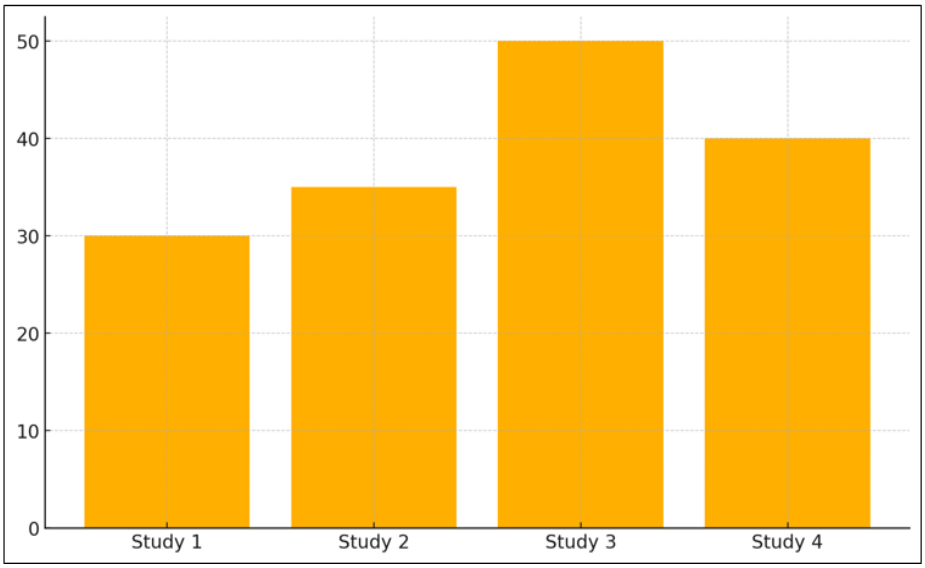

Figure 7. Study Outcome Comparison

The results of Study 3 show that participants gained the most understanding (50 %) and planned to change their behavior (30 %). However, they were less engaged (80 %), and the long-term effects were only 15 %. The big increase in knowledge shows that the teaching method worked, but the long-term change in behavior was still not very big. Study 4 shows that people learned 40 % more and were engaged 75 % of the time, the illustration in figure 7. They also planned to act 22 % more and had a 13 % longer-lasting effect. This means that the intervention was mostly successful, but it wasn't very good at keeping the behavior changes over time.

CONCLUSIONS

This systematic study shows that teaching programs have a huge potential to make college students more aware of how to find cancer. The results show that different teaching methods, like peer-led campaigns, classes, mobile apps, and online tools, can effectively teach students more about cancer risks, early warning signs, and how important it is to get screened. In particular, peer-led programs were found to build community and trust, which made people more interested and helped them remember things. For a big crowd, digital tools also worked well, making learning events available and engaging. Even though there were some good results, the study found some problems with the available research. There was a lot of variation between the studies in the review in terms of how they were set up, how they measured things, and how long they kept track of people. This made it harder to compare the results. Also, many studies only looked at things for a short time, which made it hard to tell if the higher knowledge led to long-lasting changes in how people look for cancer, like getting regular tests or self-exams Also, the studies mostly looked at certain types of cancer (like breast or cervical cancer) instead of giving a general picture of how to avoid and find cancer early. This means that the results can't be used with a larger group of college students who might benefit from learning more about cancer. Because of these holes, future research should focus on wide-ranging, long-term studies with strict methods to find out how long-lasting teaching treatments are at changing people's real actions when it comes to finding cancer. Adding lessons about cancer to college courses and building relationships with healthcare professionals could also help these efforts reach more people and work better. To sum up, educational efforts have shown potential. However, ongoing work is needed to improve the design, delivery, and scope of cancer prevention education in order to encourage college students to be more health-conscious and improve their long-term cancer results.

BIBLIOGRAPHIC REFERENCES

1. Dydjow-Bendek, D.A.; Zagożdżon, P. Early Alcohol Use Initiation, Obesity, Not Breastfeeding, and Residence in a Rural Area as Risk Factors for Breast Cancer: A Case-Control Study. Cancers 2021, 13, 3925.

2. Yahyaa, B.T. Woman's Knowledge about Breast Cancer in Al-Ramadi City, Iraq. Ann. Rom. Soc. Cell Biol. 2021, 25, 4901–4910.

3. Rozenberg, S.; Di Pietrantonio, V.; Vandromme, J.; Gilles, C. Menopausal Hormone Therapy and Breast Cancer Risk. Best Pract. Pract. Res. Clin. Endocrinol. Metab. 2021, 35, 101577.

4. Lo, C.H.; Chai, X.Y.; Ting, S.S.W.; Ang, S.C.; Chin, X.; Tan, L.T.; Saania, P.; Tuan Mat, T.N.A.; Mat Sikin, S.; Gandhi, A. Density of Breast: An Independent Risk Factor for Developing Breast Cancer, a Prospective Study at Two Premium Breast Centers. Cancer Med. 2020, 9, 3244–3251.

5. Momenimovahed, Z.; Salehiniya, H. Epidemiological Characteristics of and Risk Factors for Breast Cancer in the World. Breast Cancer Targets Ther. 2019, 11, 151–164.

6. Reddy, S.B.; Acharya, J.P. Cross-Sectional Study on Knowledge about Breast Cancer and Breast Self Examination among Female Undergraduate Students in Telangana, India. J. Med. Res. 2020, 6, 291–294.

7. Ramakrishnan, R. Clinical Features of Breast Disease. In Holistic Approach to Breast Disease; Springer Nature: Singapore, 2023; pp. 31–36.

8. Ojewusi, A.A.; Arulogun, O.S. Breast Cancer Knowledge and Screening Practices among Female Secondary Schools Teachers in an Urban Local Government Area, Ibadan, Nigeria. J. Public Health Epidemiol. 2016, 8, 72–81.

9. Rasool, S.; Iqbal, M.; Siddiqui, A.; Ahsan, R.; Mukhtar, S.; Naqvi, S. Knowledge, Attitude, Practice towards Breast Cancer and Breast Self-Examination among Female Undergraduate Students in Karachi, Pakistan. J. Adv. Med. Med. Res. 2019, 29, 1–11.

10. Manzour, A.F.; Gamal Eldin, D.A. Awareness about Breast Cancer and Mammogram among Women Attending Outpatient Clinics, Ain Shams University Hospitals, Egypt. J. Egypt. Public Health Assoc. 2019, 94, 26.

11. Rahman, S.A.; Al-Marzouki, A.; Otim, M.; Khayat, N.E.H.K.; Yousef, R.; Rahman, P. Awareness about Breast Cancer and Breast Self-Examination among Female Students at the University of Sharjah: A Cross-Sectional Study. Asian Pac. J. Cancer Prev. 2019, 20, 1901–1908.

12. Akhtari-Zavare, M.; Juni, M.H.; Said, S.M.; Ismail, I.Z.; Latiff, L.A.; Ataollahi Eshkoor, S. Result of Randomized Control Trial to Increase Breast Health Awareness among Young Females in Malaysia. BMC Public Health 2016, 16, 738.

13. Korkut, Y. Assessment of Knowledge, Attitudes, and Behaviors Regarding Breast and Cervical Cancer among Women in Western Turkey. J. Int. Med. Res. 2019, 47, 1660–1666.

14. Ghanem, S.; Glaoui, M.; Elkhoyaali, S.; Mesmoudi, M.; Boutayeb, S.; Errihani, H. Knowledge of Risk Factors, Beliefs and Practices of Female Healthcare Professionals towards Breast Cancer, Morocco. Pan Afr. Med. J. 2011, 10, 1–10.

15. Ibrahim, N.A.; Odusanya, O.O. Knowledge of Risk Factors, Beliefs and Practices of Female Healthcare Professionals towards Breast Cancer in a Tertiary Institution in Lagos, Nigeria. BMC Cancer 2009, 9, 76.

16. Wolde, M.T.; Okova, R.; Habtu, M.; Wondafrash, M.; Bekele, A. The Practice of Breast Self-Examination and Associated Factors among Female Healthcare Professionals Working in Selected Hospitals in Kigali, Rwanda: A Cross Sectional Study. BMC Womens Health 2023, 23, 622.

17. Ossai, E.; Azuogu, B.; Ogaranya, I.; Ogenyi, A.; Enemor, D.; Nwafor, M. Predictors of Practice of Breast Self-Examination: A Study among Female Undergraduates of Ebonyi State University, Abakaliki, Nigeria. Niger. J. Clin. Pract. 2019, 22, 361–369.

18. Ahmed, A.; Zahid, I.; Ladiwala, Z.F.; Sheikh, R.; Memon, A. Breast Self-Examination Awareness and Practices in Young Women in Developing Countries: A Survey of Female Students in Karachi, Pakistan. J. Educ. Health Promot. 2018, 7, 90.

19. Sarker, R.; Islam, M.S.; Moonajilin, S.; Rahman, M.; Gesesew, H.A.; Ward, P.R. Knowledge of Breast Cancer and Breast Self-Examination Practices and Its Barriers among University Female Students in Bangladesh: Findings from a Cross-Sectional Study. PLoS ONE 2022, 17, e0270417.

https://doi.org/10.56294/mw2024531

20. Suleiman, A. Awareness and Attitudes Regarding Breast Cancer and Breast Self-Examination among Female Jordanian Students. J. Basic Clin. Pharm. 2014, 5, 74–78.

21. Daly, A.A.; Rolph, R.; Cutress, R.I.; Copson, E.R. A Review of Modifiable Risk Factors in Young Women for the Prevention of Breast Cancer. Breast Cancer Targets Ther. 2021, 13, 241–257.

22. Chavez-Macgregor, M.; Clarke, C.A.; Lichtensztajn, D.; Hortobagyi, G.N.; Giordano, S.H. Male Breast Cancer According to Tumor Subtype and Race: A Population-Based Study. Cancer 2013, 119, 1611–1617.

23. Odhiambo, C.; Hunter, S. Breast Cancer Knowledge among Students at a State Comprehensive University. Teach.-Sch. J. State Compr. Univ. 2023, 12, 1.

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CONFLICT OF INTEREST

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