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Inhaltsverzeichnis

Gründe für die Nichtteilnahme am landesweiten Mammographie-Screening Programm und deren Beeinflussbarkeit durch telefonische Beratung

1. Einleitung:

1.1 Das Mammographiescreening in Deutschland

Das Mammographie-Screening-Programm (MSP) ist eine effektive Methode zur Reduktion der Brustkrebsmortalität(1–6). In Deutschland wurde ein nationales Mammographie-Screening-Programm (MSP) in den Jahren 2005 – 2008 schrittweise eingeführt und wird bis heute in allen Bundesländern durchgeführt. Hierbei wurden alle Frauen im Alter von 50 – 69 Jahren in zweijährlichen Abständen zu einer Mammographie eingeladen. Die Daten der einzuladenden Frauen stammen aus den Registern der Einwohnermeldeämter. Der Erfolg des MSP wurde in einem Bericht der Kooperationsgemeinschaft Mammographie aus dem Jahr 2009 bestätigt(7). Es konnte unter anderem bewiesen werden, dass durch das MSP eine höhere Rate an in-situ Karzinomen entdeckt wurde als zuvor. Die Durchführung des MSP richtet sich nach den europäischen Leitlinien für die Durchführung von Mammographie-Screenings(8). In dieser sind neben technischen Spezifikationen und qualitätssichernden Maßnahmen auch Richtlinien für die anzustrebenden Teilnahmequoten vorgesehen. Trotz aller Bemühungen der staatlichen Organisationen und der einzelnen Mammographieeinheiten, über die Gefahren von Brustkrebs und die Chancen der Früherkennungsuntersuchung aufzuklären, nehmen mit einer Teilnahmequote von 56% (7) deutlich weniger als die angestrebten 70% aller eingeladenen Frauen an der Untersuchung teil(8). Eine hohe Teilnahmequote ist notwendig, um die Effektivität des Screenings, insbesondere im Hinblick auf die Mortaltiätsreduktion sicherzustellen(8).

1.2 Möglichkeiten zur Steigerung der Teilnahmequote

Über die Möglichkeiten, die Teilnahmequote durch ergänzende edukative und motivierende Maßnahmen zu steigern, existieren zahlreiche Voruntersuchungen.(9–19). Unter diesen Maßnahmen erwies sich eine telefonische Beratung als besonders effizient. Zudem zeigte sich, dass eine barriere-spezifische Beratung, also eine Beratung die auf die individuellen Gründe für die Nichtteilnahme eingeht, eine weitaus höhere Effektivität besitzt, als unspezifische Beratung(20).

1.3 Gründe für die Nichtteilnahme

Die Tatsache, dass die Teilnahmequote trotz der Aufklärungskampagnen und dem hohen Aufwand, mit dem das Einladungsverfahren betrieben wird, immer noch zu niedrig ist, legt zudem die Vermutung nahe, dass spezifische Gründe existieren, die die angesprochenen Frauen dazu bewegen, sich gegen eine Mammographie-Screening-Untersuchung zu entscheiden.

Über Faktoren, die die Teilnahme am MSP beeinflussen ist bereits einiges bekannt. Vor allem sozioökonomische Faktoren wie schulische Bildung, Arbeitsverhältnis, Familienstand und Wohnort (Stadt/ländliche Region) scheinen wesentliche Prädiktoren für die Teilnahme am Mammographiescreening zu sein(21–28). Es wurde ebenfalls gezeigt, dass Frauen die einen Angehörigen pflegen, ebenso häufig am MSP teilnehmen, wie diejenigen, die dies nicht tun(29). Zudem ergab sich, dass bei Nichtteilnehmerinnen am MSP auch Risikofaktoren für andere Erkrankungen vorliegen(30). Auch das Alter der eingeladenen Frauen beeinflusst die Häufigkeit, in der Mammographie-Screening-Untersuchungen wahrgenommen werden(28,31).

In Befragungen von Teilnehmerinnen und Nichtteilnehmerinnen konnten kollektive Gründe für das Teilnahmeverhalten identifiziert werden. Die Inanspruchnahme anderer, vorsorgender Maßnahmen, insbesondere Mammographien, außerhalb des Screeningprogramms wird als Faktor für die Teilnahmebereitschaft kontrovers diskutiert(31–33). Auch der Einfluss der Angst vor einer Krebserkrankung wird in

manchen Studien als positiv(33,34), von anderen als negativ(32,35–37) für die Teilnahmebereitschaft angesehen. Andere Gründe, die mit einer Nichtteilnahme assoziiert sind, sind Indifferenz(35,38), Misstrauen gegenüber der Vorsorgemaßnahme(37), Transportprobleme(38,39), der Glaube in die eigene Gesundheit(35), Angst vor dem Untersuchungsergebnis(36) und gesundheitliche Einschränkungen(33,36,37).

1.4. Wissenschaftliche Fragestellung

Über die Effektivität der telefonischen Beratung, insbesondere in Abhängigkeit vom individuellen Grund für die Nichtteilnahme, ist jedoch wenig bekannt. Eine prospektive Studie hierzu hat, nach meiner Kenntnis bisher noch nicht stattgefunden. Erkenntnisse über diese Barrieren könnten helfen, Aufklärungskampagnen effektiver zu gestalten und somit die Teilnahmequoten insgesamt zu verbessern. Nur eine hohe Teilnahmequote kann dauerhaft gewährleisten, dass die hohen Qualitätskriterien, welchen das nationale MSP genügen muss, erfüllt werden können. Zudem könnte die Untersuchung der Effektivität einer telefonischen Beratung, bezogen auf diese Barrieren helfen, zukünftige Interventionen zeit- und kosteneffizient zu gestalten.

Ziel der Studie war es,
I. zu bestimmen, ob telefonische Beratung ein geeignetes Mittel zur Steigerung der Teilnahmequote am MSP ist,

II. die Gründe für eine Nichtteilnahme am Mammographiescreening von Nichtteilnehmerinnen im deutschlandweiten MSP zu quantitativ zu erfassen und

III. zu bestimmen, inwiefern sich diese Gründe durch eine barriere-spezifische Beratung beeinflussen lassen.

2. Materialien und Methoden

2.1 Studienpopulation:

Die Studienregion umfasste ein Screeningzentrum in Mecklenburg Vorpommern. Die ländliche Region ist seit vielen Jahren als Studienregion etabliert, die Bevölkerungsstruktur sehr gut definiert(40). Eine Zustimmung der Ethikkommission der Ernst-Moritz-Arndt Universität Greifswald und des Datenschutzbeauftragten des Landes Mecklenburg-Vorpommern lagen vor beginn der Studie vor.

2.2 Statistische Schätzung der erforderlichen Stichprobengröße

Als Referenzzeitraum für die Schätzung der Stichprobengröße wurden die Monate Juni 2006 bis Dezember 2006 verwendet. In diesem Zeitraum wurden an 39572 anspruchsberechtigte Frauen 10.252 Termine vergeben. Davon waren im Untersuchungszeitraum 7.984 Termine aus Ersteinladungen (ab der 2. Einladungsrunde nach Ablauf von 2 Jahren: Erst- und Folgeeinladungen) und 2.268 Termine aus Erinnerungseinladungen. 774 Termine wurden von den Eingeladenen verschoben, 44 bestätigt und 1.616 abgesagt. Keine Rückmeldung gab es bei 7.818 Terminen.
3.323 Teilnehmerinnen kamen aufgrund einer Erst- oder Erinnerungseinladung, 853 aufgrund einer Selbstzuweisung oder als ad-hoc Klientinnen; letztere werden nicht von der Zentralen Stelle, sondern direkt am Screeningort erfasst.
Unter der Annahme eines Fehlers 1. Art von 5% und einer Teststärke von 80 %, sowie der pessimistischen Annahme einer lediglich 10%igen Steigerung der Teilnahmerate durch die Intervention ist eine Stichprobengröße von 388 pro Gruppe (Intervention und Kontrolle) erforderlich. Bei der Kalkulation der initialen Gruppengröße musste berücksichtigt werden, dass Ausschlusskriterien (Mammographie in den letzten 12 Monaten bereits durchgeführt, terminale Erkrankung der eingeladenen Frau, Mammakarzinom in der Anamnese, falsche Meldedaten, keine verfügbare Telefonnummer) erst nach Einladung festgestellt werden können. Aus vorangegangenen

Studien ist bekannt, dass bei etwa 1/3 der eingeladenen Frauen Ausschlusskriterien vorliegen.
Die Interventions- und die Kontrollgruppe sollten daher je mindestens 520 (1,33x388) Frauen einschließen. Angesichts der vorbekannten Teilnahmequote und nach den veröffentlichten Zahlen von Frauen mit Ausschlusskriterien bei gleichzeitig unbekannter Verteilung der Gründe für die Nichtteilnahme war dazu ein vielfaches dieser Frauen einzuschließen. Aufgrund großer personeller und zeitlicher Ressourcen konnten insgesamt 1772 Frauen in die Interventionsgruppe eingeschlossen werden.

2.3 Einschlusskriterien:

Es wurden Frauen in die Studie eingeschlossen, die nach Kenntnislage die Auswahlkriterien für die Teilnahme am Mammographie-Screening-Programm erfüllten. Das Alter der eingeschlossenen Frauen lag, gemäß den Einschlusskriterien für das nationale MSP, zwischen 50 und 69 Jahren. Die teilnahmeberechtigten Frauen hatten bereits eine Ersteinladung erhalten. In dieser war neben einem Terminvorschlag auch der Untersuchungsort angegeben. Die Untersuchungsorte, die in dieser Studie betrachtet wurden, waren die 5 radiologischen Institutionen und Praxen, die zum Screening-Einheit Greifswald gehören. Alle eingeschlossenen Frauen hatten 6 Wochen nach Versand des Einladungsschreibens nicht geantwortet. Als Quelle der Namen und Adressen dienten Daten der Zentralen Stelle, einer Institution des medizinischen Dienstes der Krankenkassen (MDK), durch die die Ersteinladungen versandt und die Zuordnung zu den Untersuchungsorten sowie die Vergabe der Termine organisiert wird.

2.4 Ausschlusskriterien:

Ausgeschlossen wurden Frauen, die im vorgegebenen Zeitfenster telefonisch nicht erreicht werden konnten, entweder, weil keine Telefonnummer ermittelt werden konnte,

oder weil der Telefonanruf unbeantwortet blieb. Frauen, die während des Telefongesprächs angaben, keine Gründe für die Nichtteilnahmen nennen zu wollen oder können wurden ebenfalls ausgeschlossen. Zuletzt wurden Frauen ausgeschlossen die während der Befragung angaben, dass bei ihnen Ausschlussgründe für die Teilnahme am MSP vorlägen. Diese Gruppe beinhaltete insbesondere Frauen, die ein Mammogramm in den letzten 12 Monaten vor dem Screeningtermin hatten, oder in den letzten 5 Jahren an einem Mammakarzinom erkrankt sind und sich in kurativer Behandlung oder Nachsorge befinden.

2.5 Studienpopulation

Die Grundgesamtheit in der Rekrutierungsphase stellten alle die Frauen da, die von Februar 2008 bis Oktober 2008 anspruchsberechtigt waren und in diesem Zeitraum zum Mammographiescreening eingeladen wurden (n=16712) 5. Auf die Ersteinladung reagierten 8089 Frauen und wurden somit ausgeschlossen. Die verbleibenden 8623 Personen erhielten ein Erinnerungsschreiben und wurden in Interventions- und Kontrollgruppe randomisiert (Abbildung 1). Diesem Erinnerungsschreiben lag ein Merkblatt (Abbildung 2) bei, das die Frauen darüber informierte, dass sie gegebenenfalls im Rahmen einer klinischen Studie von einer Mitarbeiterin der Universität Greifswald telefonisch kontaktiert würden.

2.5 Ablauf der Studie

Die Randomisierung in die Interventions- oder die Kontrollgruppe erfolgte über die, von der zentralen Stelle zur Verfügung gestellten, Listen. Jede 2. Frau auf der Liste wurde in die Interventionsgruppe randomisiert, die anderen in die Kontrollgruppe. Die Zuordnung zu Interventions- und Kontrollgruppe erfolgte automatisiert mittels eines Programms in einer Microsoft Exel Tabelle. Anhand der verfügbaren Daten wurden die Telefonnummern der Klientinnen mittels eines Computerprogramms (KlickTel 2006, Buhl Data, Burbach, Germany) ermittelt. Im Zeitraum vom Februar 2008 – Oktober

2008 konnten insgesamt 1772 Frauen kontaktiert werden. Es gaben 280 Frauen an, dass bei ihnen Ausschlussgründe für die Teilnahme am MSP vorlägen. Diese wurden, ebenso wie die 32 Frauen die eine Beratung ablehnten oder keine Gründe für die Nichtteilnahme nennen wollten, aus der Studie ausgeschlossen. Insgesamt konnten 1494 Frauen befragt und beraten werden (Abbildung 1). Bei der Interviewerin handelt es sich um eine ausgebildete Sozialpädagogin, die im Vorfeld umfassend zu allen Aspekten des MSP geschult worden war.

2.6 Ablauf der telefonischen Beratung

Zu Beginn des Telefongespräches wurden den Frauen allgemeine Informationen zum MSP gegeben. Im Anschluss erfolgte eine Befragung zu Ihren individuellen Gründen für die Nichtteilnahme am Programm. Diese Gründe wurden vom Interviewer in Kategorien eingeteilt und mittels einer, eigens hierfür programmierten, Software (Artemisium GmbH und Co KG) elektronisch erfasst. Auch die Angabe mehrerer Gründe war hierbei möglich. Neben einigen vorgegebenen Gründen bestand für den Interviewer auch die Möglichkeit, neue Grundkategorien anzulegen. Ließ sich ein Grund zunächst in keine der vorhandenen Kategorien einordnen wurde die Antwort im Wortlaut als Freitext aufgenommen.

2.7 Erfassung der Gründe für die Nichtteilnahme

Es wurden 14 Kategorien erfasst, die im folgendermaßen definiert sind:

A. Zeitliche Gründe: Der Hinderungsgrund ist hier das Fehlen von Zeit oder koinzidentelle andere Termine, die nichts mit gesundheitlichen oder beruflichen Gründen zu tun haben.

B. Gesundheitliche Gründe: Die eigene Gesundheit lässt eine Teilnahme am Screening

nicht zu. Die Klientin ist durch Betreuung oder Pflege kranker oder pflegebedürftiger Angehöriger dauerhaft zeitlich und örtlich gebunden.

C. Berufliche Gründe: Zeitliche, finanzielle, räumliche oder existenzielle Gründe, die mit der eigenen beruflichen Tätigkeit zu tun haben.

D. Angst vor der Untersuchung: Der Vorgang der Untersuchung und die damit verbundenen Schmerzen, oder Missempfindungen verursachen Angst. Es wird befürchtet, die Untersuchung könne Krebs erst auslösen, oder, sie könne zu permanenten körperlichen Schäden führen. Es besteht Angst vor der Strahlenbelastung.

E. Angst vor dem Ergebnis der Untersuchung: Es besteht Angst vor dem was bei der Untersuchung gezeigt werden kann. Auch die psychische Auseinandersetzung mit dem Thema ist angstbehaftet. Die Klientin möchte es nicht wissen.

F. Vertrauen in Gesundheitssystem: Es besteht kein Vertrauen in die Kompetenz der Ärzte oder deren Beweggründe. Die grundlegende Struktur des Mammographiescreenings ist suspekt. Es werden rein wirtschaftliche Interessen als Hintergrund des MSP vermutet. Es besteht kein Vertrauen in die Medizin als Wissenschaft. Besuche oder Kontakte mit Ärzten sind generell mit Angst besetzt. Es wird vermutet, nach der Diagnosestellung würden unverhältnismäßige, oder ungeeignete Maßnahmen ergriffen, um die Krankheit zu heilen oder zu lindern.

G. Sinn der Untersuchung: Die Klientin nimmt an, die Untersuchung erfülle nicht ihren Zweck. Die Untersuchung könne das vorgegebene Ziel, durch Früherkennung schwere Verläufe einer Krebserkrankung zu vermeiden, nicht erreichen. Die Untersuchung hat im persönlichen empfinden keinen Vorteil für das eigene Leben. Im eigenen Umfeld sind keinerlei Krebserkrankungen aufgetreten. Die Klientin vertritt die Meinung, aufgrund des fortgeschrittenen Lebensalters sei die Untersuchung nicht mehr notwendig. Bei einer vorangegangenen Mammographie haben sich keine Auffälligkeiten gezeigt. Fortgeschrittene Krebserkrankungen träten auch auf, wenn

Früherkennungsmaßnahmen in Anspruch genommen werden. Aufgrund der geringen Größe der eigenen Brust sei die Untersuchung nicht notwendig. Der Sinn der Untersuchung sei in den Medien umstritten.

H. Graues Screening: Die Klientin befindet sich in einer anderen, regelmäßigen, ärztlichen Diagnostik, welche als gleichwertig, besser oder schonender wahrgenommen wird. Hierzu zählen insbesondere regelmäßige Mammographien außerhalb des MSP. Weitere genannte Vorsorgemaßnahmen umfassen regelmäßige gynäkologische Untersuchungen, Ultraschall der Brust und Selbstabtastung. War die letzte Mammographie zum Beratungszeitpunkt vor weniger als 12 Monaten, wurden die Frauen ausgeschlossen.

I. Transportprobleme: Es besteht keine, oder nur eine unverhältnismäßig aufwendige Möglichkeit zum Screeningort zu gelangen.

J. Einladung: Die verschickte Einladung kam nicht an, wurde verloren, nicht beachtet oder als nicht seriös eingestuft. Der Screeningort, an den eingeladen wurde, ist für die Klientin räumlich ungünstig gelegen; es gibt nähere Möglichkeiten für Mammographie.

K. Termin: Der Termin lag zu einem unpassenden Zeitpunkt. Eine Terminänderung wurde nicht versucht, oder war nicht möglich.

L. Andere: Alle Gründe die keiner anderen Gruppe zugeordnet werden konnten. Sehr persönliche Gründe. Es besteht Gleichgültigkeit oder Gedankenlosigkeit.

N. Glaube an Gesundheit: Die Klientin glaubt, sie sei gesund. Sie ist nie krank gewesen. Sie sieht für sich kein Risiko, an Brustkrebs zu erkranken.

O. Inanspruchnahme-verhalten: Eine medizinische Untersuchung ohne persönlich gefühlte Beschwerden, entspricht nicht dem gewohnten Inanspruchnahmeverhalten der Klientin. Sie geht generell nur im Notfall zum Arzt.

2.8 Verhalten bei unklarer Zuordnung

Die einzelnen Gründe wurden getrennt bewertet. Antworten, die primär keiner Grundkategorie zugeordnet werden konnten, wurden im Nachgang anhand des konkret angegebenen Wortlauts von zwei unabhängigen Untersuchern den bestehenden Gruppen zugeordnet. Konnte keine passende Kategorie gefunden werden, wurde die Antwort in die Gruppe „Andere Gründe“ eingeordnet (Abbildung 3)

2.9 Beratung:

Die Interviewerin bot daraufhin spezifische Informationen zu dem angegebenen Grund an. Diese stützen sich auf den offiziellen Angaben zur Effektivität und Risiko/Nutzen-Bewertung des Mammographiescreenings. Als Strategie für die Beratung diente das transtheoretische Modell von Prochaska und DiClemente(41) welches von Rakowski et. al. (42,43) auf das Mammographiescreening übertragen wurde. Gemäß dieses Modells wurden die zu beratenden Frauen zu den Vor- und Nachteilen des Mammographiescreenings beraten, mit dem Ziel, individuelle Hürden, die sie bisher von einer Teilnahme abhielten, zu überwinden. Als Beratungsinhalte dienten die offiziellen Informationen, welche von der Kooperationsgemeinschaft Mammographie herausgegeben werden(44). Diese beinhalten Antworten zu Ein- und Ausschlusskriterien, Ablauf der Untersuchung, Schmerzen bei der Untersuchung, Strahlenbelastung, Umgang mit positiven Befunden, Folgen eines positiven Befundes und Risikobewertungen. Während der Beratung wurden diese Informationen, zugeschnitten auf die Fragen und Befürchtungen der Frauen, vermittelt.

2.10 Zielkriterien

Ziel der Untersuchung war das Erfassen der Häufigkeit der genannten Gründe, sowie

der Teilnahmequote nach Beratung insgesamt, und spezifisch in Abhängigkeit vom genannten Grund. Dies geschah durch Auswertung der hierfür angelegten Datenbank, in der die individuellen Gründe erfasst wurden. Drei Monate nach Abschluss der Beratung wurde mit Hilfe der, vom Screeningzentrum zur Verfügung gestellten Daten festgestellt, ob die beratenen Frauen am MSP teilgenommen hatten. Auch bei der Kontrollgruppe, die keine Beratung erhielt, wurde die Teilnahmequote bestimmt.

2.11 Statistische Analyse

Die statistische Analyse wurde im Jahr 2022 durchgeführt und erfolgte mittels dem Programm Open Office Calc (2017, The Apache Software Foundation) und mit SAS V9.4 (2002–2012 by SAS Institute Inc., Cary, NC, USA). Die Häufigkeiten der einzelnen Gründe wurden mittels Kreuztabellen bivariant ermittelt und mittels Chi-Quadrat-Test auf Unabhängigkeit geprüft. Es wurde das Quotenverhältnis (odds-ratio OR) für eine Teilnahme der Interventionsgruppe und der Kontrollgruppe verglichen. Im Anschluss wurden die OR innerhalb der Interventionsgruppe für die einzelnen Gründe verglichen. Ergebnisse wurden als signifikant klassifiziert, wenn das 95% Konfidenzintervall um die OR die 1 nicht beinhaltete. Um Beeinflussungsfaktoren unter den Einzelgruppen zu eliminieren erfolgte zudem eine logarithmische Regressionsanalyse der Beeinflussbarkeit der Gründe durch die telefonische Beratung.

3. Ergebnisse:

In diesen prospektiven, populationsbasierten Studien wurde untersucht, ob eine telefonische Beratung ein geeignetes Mittel zur Steigerung der Teilnahmequote am landesweiten Mammographiescreening darstellt, welche Gründe von Frauen, die einer Einladung zu diesem nicht gefolgt waren, angegeben wurden und welche Subgruppen von einer Beratung profitierten.

3.1 Steigerung der Teilnahmequoten durch telefonische Beratung: Paper 1

Telephone Counseling and Attendance in a National Mammography-Screening Program

A Randomized Controlled Trial

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Background: In Germany, a mammography-screening program (MSP) was implemented on a national level. It complies with all criteria of the European guidelines for quality assurance in screening mammography; however, the attendance rate is 54%, falling short of the target attendance rate of 70%. The aim of this study was to investigate whether additional telephone counseling improves attendance among nonresponders and the level of satisfaction with telephone counseling.

Design: In a prospective RCT, women identified as nonresponders in the MSP were randomized to a control group that received written reminders or to an intervention group that additionally received telephone counseling. In a follow-up, a subset of the intervention group was contacted by telephone regarding their satisfaction with telephone counseling.

Setting/participants: In 2008, a total of 5477 women aged 50–69 years who were eligible for the German MSP but had not participated up to 6 weeks after the first invitation were included in the study.

Interventions: Individual telephone counseling consisted of scripted calls from a trained counselor who provided information on MSP and answered the woman's questions.

Main outcome measures: Report of mammography use provided by the screening unit 3 months after the reminder was sent.

Results: Analysis was conducted in 2009. Comparison of screening attendance revealed a significantly higher attendance rate in the intervention group compared with controls (29.7% vs 26.1%, $p=0.0035$). When only women for whom telephone numbers were available were analyzed, attendance was even better (35.5% vs 29.7%, $p=0.0004$). In the follow-up, 278 of 404 women were actually surveyed. Of those, 33% stated that telephone counseling had influenced their decision, 56% stated that they had undergone screening mammography, and 77% agreed that personal telephone counseling should be used routinely to encourage nonresponders to go for screening.

Conclusions: Individual telephone counseling for nonresponders to a national program for breast cancer screening was well accepted by participants and effective.

Trial registration: This study is registered at the Australian New Zealand Clinical Trials Registry ACTRN12611000645954.

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Introduction

It has long been known from the results of several randomized studies[1–6] that breast cancer mortality can be reduced by mammography screening. In Germany, a mammography-screening program (MSP) was implemented on a national level from 2005 to 2008. All women aged 50 to 69 years are eligible for a free screening mammogram biennially. Eligible women are identified from regional resident registers.

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The first report evaluating the MSP in Germany appeared in October 2009, supporting the effectiveness of the program.[7] The German MSP complies with nearly all criteria of the strict European Union guidelines for quality assurance in screening mammography; however, attendance is too low. The overall German attendance rate is approximately 54%, falling short of the target attendance rate of 70% set by the European Union guidelines.[8] The German state of Mecklenburg–Vorpommern, the region in which the present study was conducted, had a mammography-screening attendance rate of 52% in 2007.[7]

On the basis of systematic reviews of evidence from studies of selected community and healthcare systems interventions to increase cancer screening rates, the Task Force on Community Preventive Services recommends the use of client-direct interventions to increase attendance in screening for breast cancer.[9] In a review[10] of 128 studies of client-direct interventions to increase cancer screening, three interventions were shown to be effective to enhance community demand for breast cancer screening—client reminders, small media, and one-on-one education. Among these three, client reminders (e.g., printed or telephone reminders alone or enhanced by additional elements) were the most effective.[11–19] Overall, for client reminders the median post-intervention increase in completed mammography was 14 percentage points (interquartile interval = 2.0, 24.0), whereas for small media and one-on-one education it was 7 percentage points (interquartile interval=0.3, 13.2) and 9.3 percentage points (interquartile interval=4.9, 15.0), respectively.

Although all client reminders were effective in promoting repeat mammography adherence, more-intensive patient-direct strategies (e.g., telephone counseling) were more effective.[20–30] One of the first studies on telephone counseling[12] found that barrier-specific telephone counseling tripled the odds that non-adherent women would obtain mammograms after intervention. Recently, Gierisch et al.[31] found that the minimal intervention needed for sustained mammography use is a combination of a reminder followed by a priming letter and barrier-specific telephone counseling for women who become off-schedule.

Although there are many studies supporting telephone counseling as an effective strategy to promote mammography adherence, to our knowledge, there exists no study that investigated the effectiveness of promotional interventions in a national population-based MSP as in Germany, where all women of a specific age group are eligible for free screening mammograms. A high attendance level in the national MSP is desirable for several reasons: the benefits of an MSP for the population and its cost efficiency increase with attendance. Moreover, robust evaluation of the program's quality also relies on a high attendance level, as the quality of different measures of success (cancer detection rate, interval cancer rate, distribution of cancer stages) will be degraded by nonattendance.[32]

The current study investigated barrier-specific telephone counseling in the setting of the German national MSP. The objective of the study was twofold:

1. to investigate whether additional barrier-specific telephone counseling improves attendance in the German national MSP among women who do not respond to the usual invitation letters compared with mailed reminders alone; and
2. to survey the women contacted by telephone regarding their satisfaction with telephone counseling.

Methods

Study Population and Eligibility Criteria

The study was approved by the IRB and the Data Protection Commissioner of the state of Mecklenburg–Vorpommern, the German region in which this study was conducted. Women who were eligible for the nationwide MSP and who failed to have screening mammography within 6 weeks of a written invitation were included in this study. In detail for the nationwide population-based MSP, all women aged 50 to 69 years who did not have a mammogram in the preceding 12 months and were not diagnosed with breast cancer in the preceding 5 years are eligible for a screening mammogram biennially.

Sample Selection and Randomization

The Greifswald Mammography-screening Unit is one of four units in Mecklenburg–Vorpommern, the German region in which this study was conducted. Starting operation in July 2006, this unit serves 80,000 women eligible for free screening mammograms according to the guidelines of the German MSP. Eligible women and their mailing addresses are retrieved from the regional population registries. The population of Mecklenburg–Vorpommern is relatively old and mostly rural. Mammography screening is decentralized and offered by five radiologic practices distributed throughout the area. These providers perform the mammography examinations and the first reading. This form of organization was chosen in order to not discourage women from having a screening mammogram because of service distance.

For each provider, eligible women living in a predefined region (based on ZIP codes) receive mailed invitation letters biennially for each screening round, starting with the 50th birthday. The invitation letters are sent out once a week, offering appointments 2 weeks in advance. After 6 weeks, nonresponders are sent written reminders, again offering appointments 2 weeks in advance. These nonresponders were the base population of the present study. For each of the nonresponders, during the 2 weeks between the mailing of the reminder and the appointment at the screening unit, the counselor obtained the mailing addresses and retrieved the telephone numbers for telephone counseling. This procedure was approved by the Data Protection Commissioner of the state of Mecklenburg–Vorpommern.

From February through July 2008, a total of 5477 women aged 50 to 69 years who were eligible for mammography screening but had

not participated up to that point were included in the study. All women were sent reminder letters. These women were assigned randomly to the intervention group or the control group. For randomization, the mammography-organizing center transmitted the name, first name, and residential address to a study assistant who was responsible only for randomization and was not involved in telephone counseling.

The data were provided in the form of a Microsoft Excel table, which was submitted to a simple randomization procedure: every second woman from the table was assigned to the intervention group and the other women to the control group. The procedure was automated by developing a software tool that can be integrated into MS Excel. Next, all double entries and men from the two sets were removed, resulting in 2455 women in the intervention group and 2952 in the control group. The intervention group was sent written reminders together with information about telephone counseling. The control group was sent written reminders alone (Figure 1).

Intervention

The present study used barrier-specific telephone counseling as a common intervention because of the promise it had shown in previous studies[21–30] of mammography. In barrier-specific telephone counseling, the counselor uses a standardized protocol, identifies the subject's barriers to performing a health behavior, and then provides information to address and overcome the barriers. The theoretic framework includes the Health Belief Model,[33] the Transtheoretical Model,[34,35] and the Conflict Model of Decision Making.[36] In the intervention group, a female staff member who holds a university degree in social work and had 5 years of experience in motivational counseling performed telephone counseling following a scripted computer-based protocol.

The Transtheoretical Model developed by Prochaska and DiClemente[34] in the context of smoking cessation was adapted for mammography by Rakowsky et al.[37,38] According to the model, women are at various stages (precontemplation, contemplation, preparation, action, or maintenance) of readiness for mammography. Some women have relapsed and are off schedule. Additionally, the model includes the perceptions of pros, positive aspects of mammography, and cons, negative aspects of mammography, which are associated with movement from one stage to another.[39] These pros and cons are complementary to the facilitators and barriers of the Health Belief Model.[33] Considering individual facilitators and barriers to action interventions are more likely to be successful when they are tailored to a person's stage of adoption.[33,34] Parts of the telephone counseling protocol intended to reduce the barriers and increase the facilitators to screening.

Using the data provided, the counselor searched the local telephone directories with the aid of a commercial telephone software (klickTel 2006), identifying telephone numbers for 1619 of the 2455 women (66%) in the intervention group and for 1762 of 2952 (60%) of those in the control group. A total of 948 women in the intervention group were counseled. First, women were asked whether they wished information on the role of mammography screening. If so, the counselor provided a brief description of mammography. Second, according to women's current stage of readiness for mammography, the counselor provided appropriate stage-specific information.

During the most extensive part of telephone counseling, the counselor tried to identify and overcome the woman's individual barriers to screening and answered the woman's questions. In her answers, the counselor was trained to refer to a set of preformulated facts, which were derived from guidelines or other validated sources and were implemented in the information system that the counselor used for interview documentation. The components of the protocol included information on breast cancer risk, usefulness of a screening mammogram, inclusion and exclusion criteria for the German MSP, details of the mammography examination (e.g., breast compression, possible pain, and radiation exposure, information on the reliability of mammography findings, consequences of mammography findings, the screening facility, the trip to the facility, and costs). All telephone calls and topics discussed were documented during the consultations using a dedicated database.

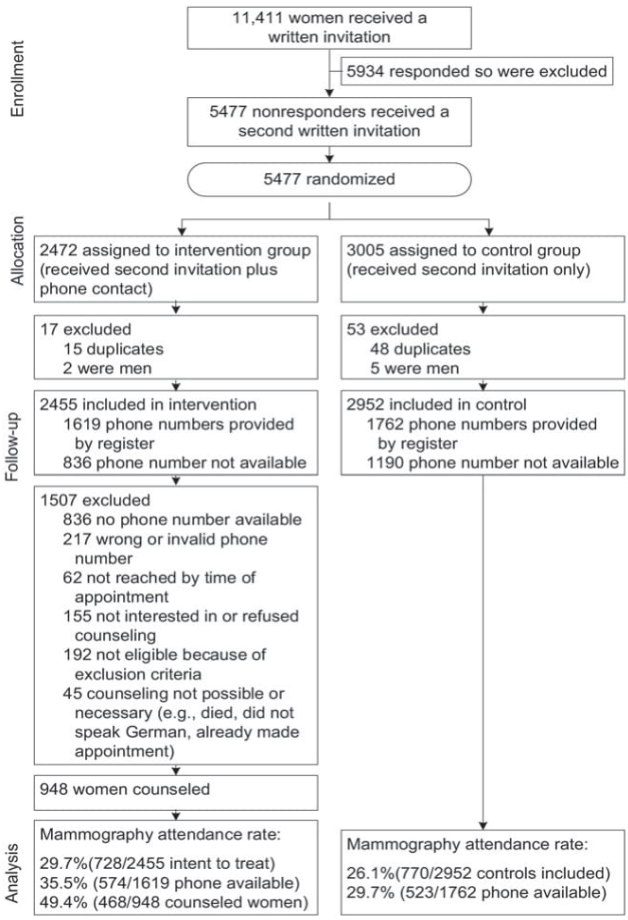

Figure 1. CONSORT diagram of study participants

Note: Eligible women for the national MSP receive mailed invitation letters. After 6 weeks, nonresponders were sent written reminders. These nonresponders were the base population of the present study and were randomized to the intervention or control group. Controls received written reminders; the intervention group additionally received telephone counseling. After randomization, all double entries and men from the two sets were removed. In the intervention group, 1507 women were not counseled for different reasons. A total of 948 women in the intervention group were counseled. Attendances rates were assessed in both groups, respectively, and groups were compared using the χ^2 test.

MSP, mammography-screening program

Outcome Measures

The primary outcome measure was mammography utilization within 3 months after the reminder was sent. Every month, the screening unit provided a list with all women who had participated in the MSP. This list was matched individually to the study base to objectively assess the attendances rates in the control and intervention group, respectively (Figure 1).

Satisfaction Study

For a follow-up survey, the first 400 women in the intervention group were called 4–8 weeks after counseling. Consecutive enrolment of the first 400 women in the satisfaction study without applying any additional selection criteria ensures that this subset is a truly randomized sample of the intervention group. The follow-up calls served two purposes: to ask counseled women how satisfied they were with the intervention and how it affected their decision concerning mammography screening, and to elicit basic sociodemographic data.

Statistical Analysis

Analysis was conducted in 2009. The additional phone call in the intervention group was the independent variable with participation measured 3 months after mailing of the reminder as the dependent variable. To calculate the effect of telephone counseling on attendance rates first, all women in the intervention and in the control group were compared (intent-to-treat analysis). Second, attendance rates were calculated for the subsets of women in both groups for whom telephone numbers were available. Groups were compared using the chi-square test. Significance was assumed at $p<0.05$. The results of the satisfaction study are given as frequencies.

Results

Attendance at Mammography Screening

Comparison of screening attendance between the intervention group and controls (intent-to-treat) shows a slightly higher rate in the intervention group (728/2455, 29.7%, vs 770/2952, 26.1%, in controls, $p=0.0035$; Figure 1). For the subgroup of women for whom telephone numbers could be retrieved, the participation rates were higher in both groups, and the difference between the intervention group and control group becomes more pronounced (574 of 1619, 35.5%, vs 523 of 1762, 29.7%, $p=0.0004$). Hence, both the more-conservative intent-to-treat analysis and the analysis based on the subset of women who were actually available for telephone intervention showed a beneficial effect of telephone counseling. From February through July 2008, a total of 948 of the 2455 women in the intervention group were counseled by telephone (38.6%). The reasons for the high proportion of women not counseled in the intervention group (1507 of 2455, 61.4%) are listed in Figure 1. Of the 948 women actually counseled in the intervention group, 468 (49.4%) had a subsequent screening mammogram.

Results of the Satisfaction Study

For organizational reasons (e.g., repeated calls if a number was not reached the first time), a total of 404 women were called again for the follow-up survey. Of these 404 women, 125 (30%) stated they had not received a telephone counseling, did not recall one, or refused to answer questions on the phone. One woman hung up the phone without providing any response. Thus, follow-up survey results are available for a total of 278 women. Differences in the numbers of women responding to the individual questions are due to the fact that not all women answered all questions.

The 278 women who were surveyed in the satisfaction study ranged in age between 50 and 71 years. The majority of women were married (211, 76%). Regarding education, 146 women (53%) had 8 years of schooling and 111 women (40%) 10 years. Only 18 women (6%) had a high school diploma, and two women had no school-leaving certificate. At the time of the survey, 149 women (54%) were retired, 95 (34%) were in employment, and the remaining 12% had no permanent employment.

The vast majority of women, 256 of 278 (92%), stated that they were satisfied with the counseling they had received. Ninety-three women (33%) confirmed that the intervention had affected their decision to attend mammography screening. Slightly more than half of those surveyed (155, 56%) said they had had a screening mammogram. Asked whether telephone counseling should be routinely offered if reminding women to undergo mammography screening, 198 women (71%) agreed, and 214 women (77%) said that telephone counseling should be offered to all women in Germany who fail to attend screening mammography after the usual invitation letter.

Discussion

This prospective randomized population-based intervention study assessed whether additional barrier-specific telephone counseling improves attendance among nonresponders in a national mammography-screening program. It extends the work of others[23,29–31,40] who have used similar approaches. Results indicate that reminders followed by telephone counseling for women who do not respond to the usual invitation letters improved screening mammography attendance compared with written reminders only. Levels of acceptance and satisfaction with the telephone counseling nonresponders had received were high among the women who were surveyed in the satisfaction study.

The present study supports previous literature[20–30] showing effectiveness of simple mammography reminders and extends these findings to a setting of a national breast cancer screening program. When women received

written reminders alone, screening attendance rate was 26.1% for the more conservative intention-to-treat analysis and 29.7% for the subgroup of women for whom telephone numbers could be retrieved. These numbers translate to a screening attendance rate of 29.7% (+4%, absolute percentage points) and 35.5% (+6%, absolute percentage points), respectively, suggesting that substantially more women received regular mammograms after delivery of telephone counseling. However, because the current study did not collect information on participants' medical and demographic backgrounds or previous screening histories, it is not possible to determine how much of these effects were due to intervention effects. It was assumed that consecutively enrolling every second women of the list provided by the mammography-organizing center to the intervention group without applying any additional selection criteria ensured that this was a truly randomized group.

This study used barrier-specific telephone counseling as a common intervention in addition to a written reminder because it had shown to be the minimal intervention needed for sustained mammography use for women who become off-schedule,[31] and because it can be integrated into large-scale studies.[41,42] Baron and colleagues[10] reviewed 39 studies of the effectiveness of client-direct reminders to increase breast cancer screening. Although all reminders were effective in promoting mammography adherence, telephone reminders were more effective than printed reminders alone. Many studies[10,12,21,22,27,28,43] support telephone counseling as an effective strategy to promote mammography adherence. They report on an improvement of attendance rates between +10 and +41 absolute percentage points. Compared with these results, the increase in attendance the present study achieved appears to be rather moderate. On the other hand, the intervention effect observed in the present study is consistent with the effects reported by Costanza et al.[23] of telephone counseling compared to annually mailed reminders in women with mammography underuse. In their study, barrier-specific telephone counseling modestly (+2%, absolute percentage points) increases utilization.

One reason for the modest increase in mammography adherence in the present study is that for 34% of the women of the intervention group, telephone numbers could not be retrieved. Because of the strict data-protection regulations in Germany, individuals' phone numbers are not listed in the regional population registries, and the study team had no access to women's telephone numbers through the physicians or screening units. For locating them, the counselor had to rely on commercial telephone software. The low success is attributable to a decreasing willingness to have one's private phone number listed in a public directory.

An analysis of the subset of study subjects for whom telephone numbers were available revealed an increase in attendance in both groups and a greater beneficial effect in the intervention group (35.5% vs 29.75% in controls). Hence, even more women might have been induced to undergo mammography screening by calling them at home if more telephone numbers had been available (e.g., by obtaining them from the screening units). This expectation is based on the fact that nearly half of the women in the intervention group had a mammogram after telephone counseling and is also further supported by the results of the satisfaction study. Overall, 56% of the women counseled stated that they had a screening mammogram.

Another reason for the low success is that this study population had a large proportion of women reluctant toward mammography screening as it consisted exclusively of women who had not participated after receiving a written invitation and did not include those women who had a mammogram after the usual invitation. On the basis of their findings that telephone counseling was not more effective than the control condition in increasing mammography utilization for under-users, Stoddard and colleagues[44] concluded that telephone counseling may be inadequate to motivate today's never-users. In the present satisfaction study, most women surveyed reported being satisfied with telephone counseling but two thirds of them stated that counseling did not influence their screening decision, indicating that there are additional barriers to screening not addressed by telephone counseling.

An additional barrier that may have contributed to the modest increase in mammography adherence could be the population of the state in which the study was conducted. This population is relatively poor and mostly rural and a great number of women did not participate because of the long distances and costs associated with the trip. Several intervention studies[19,45–50] demonstrate the effectiveness of reducing structural barriers in increasing breast cancer screening. It may well be that additional interventions reducing time or distance between service delivery settings and target populations or offering services in alternative or nonclinical settings (e.g., mobile mammography units or free transportation) may be needed for this subgroup. Some others reasons given by women who never had a mammogram were deep negative feelings about mammography, irrational beliefs in unassailable good health, or disbelief in preventive medical actions of any type.[51,52] An important area for future research is to clear whether repeated calls, a combination of calls with other interventions, or quite differ-

ent interventions are needed for this recalcitrant subgroup.

The results from the satisfaction study demonstrate that the overall level of acceptance of barrier-specific telephone counseling is very high. The vast majority of women (92%) stated that they were satisfied with telephone counseling and 77% of the women agreed that this form of intervention should be available to all women in Germany needing a reminder to attend breast cancer screening. But additional interventions to reduce structural barriers and interventions for women more reluctant toward mammography screening must be tested in conjunction with telephone counseling to reach all subgroups of nonresponders.

The current study has several limitations. First, it did not collect demographic background information. Because no control variables were included in the analysis, it is not possible to determine how much of the reported effects were due to intervention effects. Second, because the counselor had to rely on commercial telephone software to locate study participants, the study had low reach. Third, although telephone numbers were available, 2.6% of the women in the intervention group could not be contacted by the time of their scheduled mammogram appointment. Hence, even more women might have been induced to undergo mammography screening by telephone counseling if the time interval between the mailing of the reminder and the appointment at the screening unit had been longer than 2 weeks. Last, because this study did not include a detailed cost-effectiveness analysis, it remains unclear whether the intervention's effect is clinically and financially meaningful for the German MSP.

Conclusion

This prospective randomized population-based intervention study implemented barrier-specific telephone counseling in the setting of a national population-based breast cancer screening program. The results indicate that reminders followed by barrier-specific telephone counseling for nonresponders improved screening mammography attendance rates compared with written reminders only. If it is widely implemented on a population level, telephone counseling could substantially improve attendance in national screening programs if a larger percentage of participants are reached for telephone counseling; future effectiveness trials should test this assumption. These trials should focus on cost analyses and long-term outcomes. Further, to reach all subgroups of nonresponders, a combination of barrier-specific telephone counseling to reduce individual's barriers with interventions to reduce structural barriers might be promising to increase mammography adherence in the German MSP.

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All authors certify that there is no actual or potential conflict of interest in relation to this article. They disclose all funding sources that supported their work as well as all institutional and corporate affiliations. Also, all authors certify that there are no commercial associations, current and over the past 5 years, that might pose a conflict of interest.

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Ergebnisse:

In der betrachteten Gruppe von 2455 Frauen waren für 1619 Individuen Telefonnummern verfügbar. Von diesen konnten 948 (38,6%) telefonisch beraten werden. Es zeigte sich eine signifikante Steigerung der Teilnahmequote in der Interventionsgruppe (intent-to-treat) (728/2455, 29,7%) im Vergleich zur Kontrollgruppe (770/2952, 26,1%) (p 0,0035). Innerhalb der Subgruppen, bei denen Telefonnummern zur Verfügung standen, war der Unterschied noch größer (574/1619, 35,5% in der Interventionsgruppe, vs. 523/1762, 29,7% in der Kontrollgruppe, p 0,0004). Betrachtet man letztendlich die Gruppe, die tatsächlich eine Beratung erfahren hat zeigte sich ein hochsignifikanter Effekt der telefonischen Beratung. Von den 948 beratenen Frauen nahmen 468 im Verlauf am MSP teil (im Vergleich zur Kontrollgruppe 523/1762 29,7% $p<0,00001$).

3.2. Prävalenz der Gründe für die Nichtteilnahme und Beeinflussbarkeit dieser durch telefonische Beratung: Paper 2

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Article

Reasons for Non-Attendance in the German National Mammography Screening Program: Which Barriers Can Be Overcome Using Telephone Counseling?—A Randomized Controlled Trial

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Abstract: Introduction: Germany has established a national mammography screening program (MSP). Despite extensive awareness campaigns, the participation rate is only 54%, which is considerably below the European guidelines' recommendation of at least 70%. Several reasons why women do not participate are already known. Telephone consultations along with invitation letters have improved the participation rate. Here, we analyzed the reasons for non-participation and offered barrier-specific counseling to examine which impediments can be overcome to improve participation. Study Design: In a randomized controlled trial, women who had not attended their proposed screening appointment in the MSP after a written invitation were contacted by telephone and asked why they did not attend. Barrier-specific counseling via telephone was then offered. Participation in the MSP was rechecked 3 months after counseling. Setting: 1772 women, aged 50–69 years, who had not scheduled a mammography screening after a written invitation were contacted by telephone and asked for their reasons for non-participation. Intervention: The reasons were recorded by the calling consultant and categorized either during the call or later based on their recorded statements. Afterward, the women received counseling specific to their statements and were given general information about the MSP. Main outcome measures: We categorized the reasons given, calculated their frequency, and analyzed the probabilities to which they could be successfully addressed in individual counseling. Participation rates were determined post-consultation according to the reason(s) indicated. Results: The data were analyzed in 2022. After exclusions, 1494 records were analyzed. Allowing for multiple reasons to be stated by every individual 3280 reasons for not attending were abstracted. The most frequent reason was participation in "gray screening" (51.5%), which included various breast cancer prevention measures outside the national MSP. Time problems (26.6%) and health reasons (17.3%) were also important. Counseling was most effective when women had not participated for scheduling reasons. Conclusion: Several reasons prevented women from participating in the MSP. Some reasons, such as time-related issues, could be overcome by telephone counseling, but others, like barriers resulting from fear of the examination procedure or its result, could not.

Keywords: mammography; screening; non-attendance; telephone consultation

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1. Introduction

Mammography screenings can effectively reduce breast cancer mortality [1–6]. In Germany, a national mammography screening program (MSP) was gradually introduced between 2005 and 2008 and is now implemented in all German states. All women aged 50–69 years are invited in biennial intervals to receive a mammogram. Personal data on the invitees are derived from local registries. The cooperative association for mammography confirmed the success of the MSP in 2009, demonstrating that a higher rate of in situ

carcinomas was detected via the MSP compared with that before 2009 [7]. A higher rate of in situ carcinomas in a screening mammogram is considered a surrogate parameter for breast cancer mortality reduction [7]. The MSP is implemented based on the European guidelines for the implementation of mammography screenings [8]. These guidelines recommend the desired participation rates, technical specifications, and quality assurance measures. Despite the efforts of state organizations and individual mammography units to inform women about the dangers of breast cancer and the benefits of early detection, the participation rate is 56% [7], which is significantly less than the targeted rate of 70% [8]. A high participation rate, however, is necessary to ensure the effectiveness of the MSP, particularly to reduce breast cancer mortality [8].

Because the participation rate in Germany remains too low, despite awareness campaigns and high expenditures used in the invitation process, it is likely that specific reasons exist that lead women to decide against undergoing mammography screenings.

Some predictors of non-participation are already known. Socioeconomic factors, such as education, employment, marital status, and residence (urban/rural), seem to exert a significant impact on MSP participation [9–16]. Women with caregiving responsibilities are equally likely to participate in MSPs as are women without such obligations [17]. Additionally, non-participants exhibited risk factors for other diseases [18]. The ages of the women invited also affect the frequency at which they attend mammography screenings [16,19].

Surveys of participants and non-participants identified important reasons for participation. However, whether participating in other early-detection measures, including mammograms, received outside the screening program, increases or decreases participation rates remain uncertain [19–21]. Some studies have shown that the fear of having cancer encourages women to attend mammography screenings [22,23], but other studies have shown the opposite [20,23–25]. More reasons associated with non-participation include feelings of indifference [23,26], distrust in preventive measures [25], unavailability of means of transportation [26,27], belief in one's own health [23], fear of examination results [24] and health restrictions [21,23,25].

Numerous preliminary studies have analyzed measures taken to increase participation rates using complementary educational and motivational interventions [28–38]. Among these measures, telephone consultations are particularly efficient. Additionally, barrier-specific counseling, i.e., information that addresses individual reasons for non-participation, has a higher efficiency than non-specific counseling [39]. Getting counseled could provide a nudge towards screening participation without limiting the individual's free choice.

We have conducted a randomized controlled trial to assess the effects of barrier-specific telephone counseling and the results have been published [28]. In the course of this study, detailed data on the individuals' reasons for non-attendance have been obtained.

Little is known about the effectiveness of telephone counseling in relation to individual reasons for non-participation. To the authors' knowledge, no prospective study has been conducted on this topic. Knowing individual barriers can help make education campaigns more effective and thus improve overall participation rates. Additional studies on the effectiveness of telephone counseling tailored to address individual barriers could help make future interventions more time- and cost-efficient.

This study aimed to determine and quantify the reasons for non-participation in mammography screenings in the Germany-wide MSP and determine whether barrier-specific counseling can influence participation rates.

2. Methods

2.1. Study Population

The study region comprised one screening center in the state of Mecklenburg-Vorpommern. This rural region has been established as a study region for many years, for example, in the population-based "Study of health in Pommerania (SHIP)" [40]. The population structure is well-defined [41]. The local Ethics Committee of the Ernst-Moritz-Arndt University of Greifswald and the Data Protection Officer of the state of Mecklenburg-Vorpommern, approved the

study. Telephone counseling has been shown to significantly increase MSP participation by Hegenscheid et al., 2011 [28].

2.2. Inclusion Criteria

Women eligible for the nationwide MSP who failed to have a mammography screening within 6 weeks of a written invitation were included in this study (Figure 1). For the nationwide population-based MSP, all women aged 50–69 years, who have not had a mammogram in the preceding 12 months and have not been diagnosed with breast cancer in the preceding 5 years, are eligible for a biennial mammogram screening. In this study, eligible women were sent a written invitation specifying the location, date, and time for the examination. The examination locations for the eligible women were five radiology institutions and practices that are part of the Greifswald screening unit. All included women had not attended their scheduled screening appointment and had not responded to their reminder letters 6 weeks after delivery. Telephone numbers needed to be available for all included women (Figure 2).

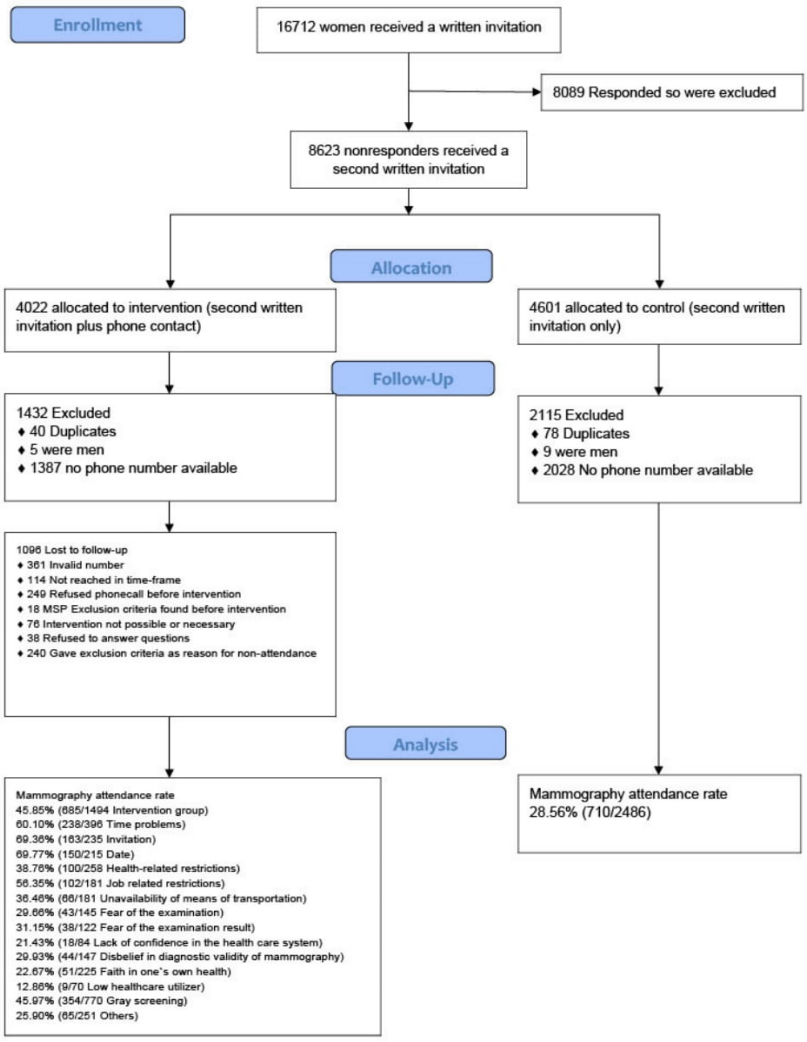

Figure 1. Participant flow chart.

Participant characteristics:
- Women aged 50–69
- No mammogram taken in the last 12 months
- No breast cancer diagnosed in the last 5 years
- Did not respond to written invitation
- Phone number available
- Telephone counseling possible

Figure 2. Participant characteristics.

2.3. Exclusion Criteria

Women who could not be contacted via telephone because the phone call went unanswered within a 2-week time frame with multiple contact attempts were excluded. Those who did not want to or could not give a reason for their non-participation during the conversation (e.g., because they did not speak German) were also excluded from the intervention group. If the calling consultant found that the client met exclusion criteria for the MSP, that client was also excluded.

The eligible population size was 39,570 women. With a margin of alpha-error of 5% and a power of 80% the sample size was at least 388 for the intervention and 388 for the control group, assuming a 10% higher participation rate in the intervention group. Because the distribution of reasons for non-attendance was not known at the beginning and telephone numbers were thought to be available only for 40% of women, we wanted to include as many women as possible. Due to the efficacy and growing experience of the interviewer as well as the automated handling of the client data, we were able to include 1772 individuals.

2.4. Study Procedure

All women who did not respond to the first written invitation received a reminder. This reminder came with a leaflet informing the women that they may be contacted via telephone by a staff member of the University of Greifswald as part of a clinical trial. Randomization to the intervention or control group was achieved using lists provided by the central office for mammography screening. Every second woman on the list was randomized into the intervention group, the other into the control group (1:1). Clients' phone numbers were retrieved from available data using a computer program (KlickTel 2006, Buhl Data, Burbach, Germany). Women in both groups whose telephone numbers could not be retrieved were excluded. The control group was not contacted via telephone. A total of 1772 women were contacted. Of these, 280 women stated that they had not responded to the invitation because they met exclusion criteria for the MSP. These women were excluded from the study, as were 32 women who did not want to state their reason for non-participation. Overall, 1494 women were interviewed. The interviewer was a female social worker with specialized training in health care counseling, primarily concerning all aspects of the MSP.

All contacted women were asked for consent to telephone counseling at the very beginning of the telephone call. If consent was given, the women received general information about the MSP. After the survey, the clients' individual reasons for non-participation were determined. The reasons given by the client were categorized by the interviewer using computer software designed for this task (Artemisium GmbH and Co KG). The computer program was designed to record multiple reasons per client. At the beginning of the study, the interview addressed the most common reasons for non-participation, and the software allowed the creation of new categories. If clients' reasons did not fit any of the existing

categories, the interviewer could also type in individual reasons as free text. The free-text reasons were later categorized by two independent examiners. If an individual reason for non-participation did not fit any category it was filed under "other reasons". If the client stated more than one single reason she was added to multiple subgroups.

2.4.1. Consultation

After determining the reasons for non-attendance, the interviewer provided specific information according to the client's stated reason. The information was based on official data from the effectiveness and risk/benefit assessment of mammography screening. The trans-theoretical model of Prochaska and DiClemente [42], which was transferred to mammography screening by Rakowski et al. [43,44], was used as a consulting strategy. According to this model, women were informed of the advantages and disadvantages of mammography screenings with the aim of overcoming individual barriers previously preventing them from participating. When the client asked for information on a particular aspect of mammography screening, we used official information issued by the cooperative association for mammography, a non-profit joint venture of the National Association of Statutory Health Insurance Funds and the National Association of Statutory Health Insurance Physicians tasked with certification of all screening units as well as public relations/communication of health information related to the breast cancer screening program [45]. They provided information on the inclusion and exclusion criteria, the conduct of the diagnostic measure, information on pain and discomfort due to mammography, radiation exposure, handling of positive results, consequences of a positive result, and risk assessment. We exclusively used this official information to avoid confusing the client. Telephone calls usually lasted between 15 and 20 min.

2.4.2. Objectives

The analysis was conducted to determine the prevalence of reasons for non-attendance and to investigate which obstacles could be overcome by telephone counseling.

We checked each individual's attendance 3 months after the telephone consultation using lists from the central screening administration. The evaluation was performed using the database in which individual reasons were recorded.

2.5. Statistical Analysis

Statistical analysis was performed in 2022. Table 1 lists the frequencies of patients in the control group and the intervention group, as well as the participation rates. In order to remove inter-categorial influences, we made an adjusted analysis. In an age-adjusted logistic regression, the influence of the variables "Time problems", "Invitation", "Date", "Health-related restrictions", "Job-related restrictions", "Unavailability of means of transportation", "Fear of the examination", "Fear of the examination result", "Lack of confidence in the health care system", "Disbelief in diagnostic validity of mammography", "Faith in one's own health", "Low healthcare utilizer", "Participates in gray screening" and "Others" were examined in regard to the attendance of mammography-screening.

The reasons for non-participation are given as absolute numbers as well as percentages for participants and non-participants. Categorical data are expressed as the absolute number and percentages. Bivariate associations of potential risk factors with participation were calculated with multinomial logistic regression. Odds ratios (OR) are reported with 95% confidence intervals. A p-value of <0.05 was considered to indicate statistical significance.

Statistical analyses were carried out with SAS V9.4 (2002–2012 by SAS Institute Inc., Cary, NC, USA).

Table 1. Reasons for non-attendance.

	n	%	Participants	Non-Participants	Participation Rate	OR	95%CI		*p* Value
Controls	2486		710	1776	28.56%				
Intervention group	1494		685	809	45.85%				
Block 1: Organizational problems									
Time problems	396	26.51%	238	158	60.10%	0.45	0.34	0.61	<0.0001
Invitation	235	15.73%	163	72	69.36%	0.32	0.23	0.45	<0.0001
Date	215	14.39%	150	65	69.77%	0.38	0.27	0.52	<0.0001
Block 2: Limited resources									
Health-related restrictions	258	17.27%	100	158	38.76%	1.13	0.83	1.54	0.4229
Job-related restrictions	181	12.12%	102	79	56.35%	1.10	0.75	1.61	0.6372
Unavailability of means of transportation	181	12.12%	66	115	36.46%	1.18	0.83	1.68	0.3481
Block 3: Negative perception									
Fear of the examination	145	9.71%	43	102	29.66%	1.34	0.89	2.02	0.1628
Fear of the examination result	122	8.17%	38	84	31.15%	1.01	0.69	1.67	0.7554
Lack of confidence in the health care system	84	5.62%	18	66	21.43%	1.72	0.95	3.12	0.0730
Disbelief in diagnostic validity of mammography	147	9.84%	44	103	29.93%	1.23	0.74	1.73	0.5835
Faith in one's own health	225	15.06%	51	174	22.67%	2.01	1.40	2.90	0.0002
Low healthcare utilizer	70	4.69%	9	61	12.86%	2.81	1.31	6.01	0.0078
Block 4: Others									
Participates in gray screening	770	51.54%	354	416	45.97%	1.06	0.84	1.33	0.5974
Others	251	16.80%	65	186	25.90%	1.70	1.21	2.38	0.0020

3. Results

In total, 1494 women were interviewed and counseled via telephone. Allowing for multiple answers, 3281 reasons for non-participation in the MSP were recorded. Whether the client later attended the MSP was determined 3 months post-consultation. The intervention was supported by German cancer aid (Grant no. 107992).

3.1. Control Group

The control group consisted of 2486 women. The age structure did not differ from that of the intervention group (mean age control group 59.57 years; mean age intervention Group 59.22 years). All women in the control group were sent written reminders prior to inclusion. Telephone numbers were available for all individuals; however, the controls were not contacted. The participation rate was 28.6% (710 participants; 1776 nonparticipants).

3.2. Individual Reasons

We first examined how often specific reasons were stated. We also calculated participation rates for each reason given (Table 1). To determine whether a specific reason for non-attendance had a higher or lower susceptibility to counseling relative to other reasons, we compared participation rates within the intervention group between those who had given that reason and those who had not. Odds ratios (OR) below one suggest that counseling may lead to a higher participation rate, whereas ORs greater than one suggest no effect of counseling. Neither did the number of reasons given by each individual (mean 2.2; median 2.0) correlate to participation, nor did age (data not shown). Odds ratios are shown in Figure 3. For a better overview, individual reasons are shown in four category blocks. These blocks each contain reasons for non-attendance representing a different aspect of mammography screening.

3.3. Categories in Detail

Block 1: Organizational Problems

Problems surrounding the organizational aspect of screening

Time problems:

Of the 1494 clients surveyed, 397 (26.57%) stated time problems as a reason why they did not participate in the screening. If the lack of time was due to health-related

problems or long working hours, the reason was filed under the respective categories. After consultations, 238 women (59.95%) with time problems attended mammography screening (compared to 40.71% of those who stated other reasons; odds ratio [OR] 0.45; 95% confidence interval [CI] 0.34–0.61; $p < 0.0001$, significant).

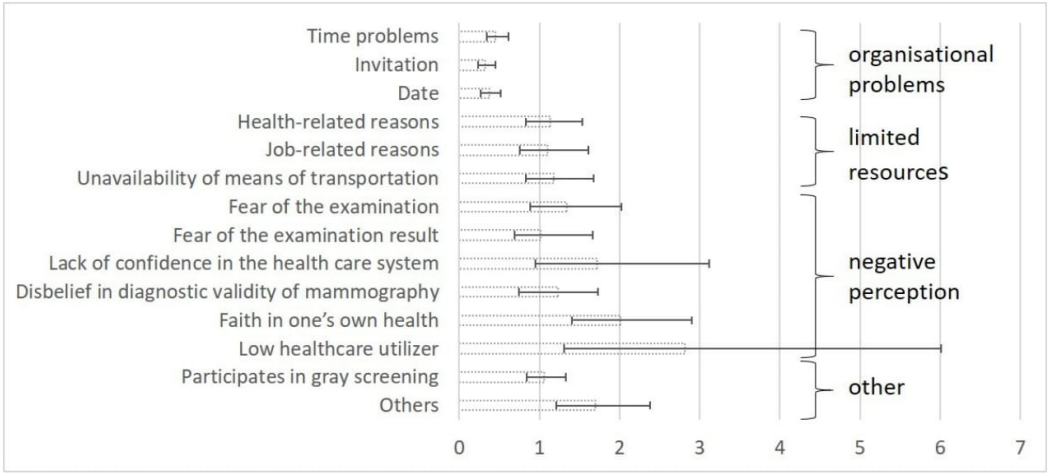

Figure 3. Odds-ratios for participation.

Invitation:

For 235 women (15.73%), the invitation letter was either not received, ignored, or considered not credible. After telephone contact, 163 of the women (69.36%) appeared for the next scheduled examination (compared to 41.46%; OR 0.32; 95% CI 0.23–0.45; $p < 0.0001$; significant).

Date:

The appointment date set in the invitation letter was inconvenient for 215 women (14.39%), and they either did not attempt to change or could not change the appointment date or time. Following a consultation explaining the possibilities for individual scheduling, 69.77% (150 women) participated in the MSP (compared to 41.83%; OR 0.38; 95% CI 0.27–0.52; $p < 0.0001$; significant.)

Block 2: Limited resources

Problems originating in the client's limited ability to attend

Health-related restrictions:

For 258 women (17.27%), personal health issues or care-taking responsibilities prevented them from attending the screening. One hundred of the advised women decided to participate later (38.76% compared to 47.33%; OR 1.13; 95% CI 0.83–1.54; $p = 0.4229$, not significant).

Job-related restrictions:

One hundred eighty-one women (12.12%) stated that they did not attend the screening due to long working hours or difficulty leaving their workplace. Specific counseling enabled 102 of these women (56.35%) to overcome the issues (compared to 44.40%; OR 1.10; 95% CI 0.75–1.61; $p = 0.6372$; not significant).

Unavailability of means of transportation:

One hundred eighty-one women (12.12%) stated that they could not arrange transportation to the examination site. After telephone consultation, 66 women (36.46%) attended (compared to 47.14%; OR 1.18; 95% CI 0.83–1.68; $p = 0.3481$; not significant).

Block 3: Negative perception

Barriers resulting from preconceptions

Fear of the examination:

Fear that the examination procedure would be associated with pain or discomfort or that receiving a mammogram could cause cancer or lead to permanent physical damage or fear of radiation exposure prevented 145 women (9.17%) from participating. After consultation, 43 of these (29.66%) received a mammogram (compared to 47.59%; OR 1.34; 95% CI 0.89–2.02; $p = 0.1628$; not significant).

Fear of the examination result:

Overall, 122 women (8.17%) said they were afraid of a potentially suspicious finding on their mammogram and therefore did not attend. After a specific consultation, 38 women (31.15%) participated in the screening (compared to 47.16%; OR 1.01; 95% CI 0.69–1.67; $p = 0.7554$; not significant).

Lack of confidence in the health care system:

Eighty-four respondents (5.62%) had no confidence in the competence of the doctors or distrusted their motives and believed that mammography screening was dishonest. After consultation, 18 women (21.43%) received the screening (compared to 47.30%; OR 1.72; 95% CI 0.95–3.12; $p = 0.0730$; not significant).

Disbelief in diagnostic validity of mammography:

One hundred forty-seven women (9.84%) expressed doubts about the usefulness of mammography screening; they believed that mammographies were either unable to prevent breast cancer or were unnecessary. Forty-four women (29.93%) attended the screening after consultation (compared to 47.59%; OR 1.23; 95% CI 0.74–1.73; $p = 0.5835$; not significant).

Faith in one's own health:

A strong belief in one's own health prevented 225 women (15.06%) from participating in the screening program; 51 of these women (22.67%) participated in the MSP after telephone counseling (compared to 49.96%; OR 2.01; 95% CI 1.40–2.90; $p = 0.0002$; significant).

Low healthcare utilizer:

Seventy women (4.69%) did not want to undergo diagnostic measures in the absence of symptoms. After consultation, nine of these women (12.86%) received mammograms (compared to 47.47%; OR 2.81; 95% CI 1.31–6.01; $p = 0.0078$; significant.).

Block 4: Other

Other reasons

Participates in gray screening:

These are women who had already received diagnostic measures for early detection of breast cancer outside the MSP (e.g., regular mammograms, gynecological examinations, breast ultrasound, self-screening). Over half of all respondents (770 women; 51.54%) indicated this and therefore did not respond to the MSP invitation. After consultation, 354 women (45.91%) participated in the MSP (compared to 45.72%; OR 1.06; 95% CI 0.84–1.33; $p = 0.5974$; not significant).

Other:

Two hundred fifty-one women (16.80%) had personal reasons or reasons that did not fit in any other category. Of these, 65 (25.90%) participated in the investigation after consultation (compared to 49.88%; OR 1.70; 95% CI 1.21–2.38; $p = 0.0020$; significant).

4. Discussion

4.1. Summary

We analyzed reasons for non-participation in the national MSP given in a population-based intervention study and the potential of barrier-specific counseling [46]. Organizational problems have been shown to be most amenable to telephone counseling, whereas the largest group of non-participants, who took gray-screening measures was impervious to counseling.

4.2. Context

Numerous studies have shown that, compared to repeated written invitations, telephone consultation can increase participation rates [13,18,19,47]. The current study shows that the effectiveness of this intervention mostly depends on the individuals´ reason for non-attendance. Overall, the participation rate for women who had not complied with the initial written invitation was significantly higher when they were counseled by phone (45.85% vs. 28.56% controls; RR 1.61; 95% CI 1.48–1.74). This rate of increase was consistent with other studies [30,31,33,35,36,39,48] where absolute increases in participation from 10 to 41% were found. Notably, we included only women who were actually advised by phone.

Most of the reasons given for non-participation in MSPs in other studies [19–27] were also given by participants in the current study. Most participants (51.54%) indicated that they had taken measures for breast cancer screening outside the national MSP. This is consistent with the findings of Baré in 2003 who found a high proportion of non-participants performing self-scanning and undergoing regular gynecological examinations [19]. In 2014, Moutel et al [49]. showed a connection between low participation rates in organized screening programs and a high number of mammograms outside the MSP. Our findings were consistent with these, likely because of the low-threshold access to mammograms combined with the very high rate of women covered by health insurance in Germany. Because women who had a mammogram in the last year before their scheduled screening were excluded from the study, the actual number of women in the gray-screening category may be higher than the proportion calculated here. This deserves special attention because organized screening programs have higher examination and diagnostic standards than do those performed outside these programs [49].

4.3. Key Findings

To our knowledge, this is the first analysis of the influence of telephone counseling according to individual reasons for non-participation (PubMed Search). In this analysis, we compared the ORs of various specific reasons for non-participation in the MSP. We compared the participation rates within a group of counseled women, depending on their stated reasons for non-attendance, as well as with a control group of women who did not receive telephone counseling. The intervention showed particularly good effects among clients who could not attend on the examination date specified in the invitation letter as well as for those who stated that they did not receive the invitation or had perceived it as non-credible. Participation rates also increased in the group that had time problems participating in the screening.

Some groups were not more likely to attend after consultation, including the group that used medical services only in cases of illness (low healthcare utilizer). If the reason for non-attendance was the belief in one's own health or distrust in the health care system, telephone counseling did rather not alter that individual's decision. The group that underwent gray screenings also showed no significant increase in participation after counseling.

Our results show that telephone counseling is a successful means of overcoming organizational barriers towards participation in the MSP. In these cases, the opportunity to reschedule their appointment is an effective nudge towards screening participation.

4.4. Implications for Future Research

Approaches to address the most common reasons for non-attendance should focus on finding ways to reduce gray screenings and better communicate the option of individual scheduling of MSP appointments. Therefore, technical solutions need to be explored, that address these issues. Moreover, future research should find ways to identify the cause of negative conceptions of mammography screening and ways to make women rethink these.

4.5. Strengths and Limitations

The quantification and distribution of reasons for non-attendance had, to the authors' knowledge, not been studied before. We were able to include a great number of women, who we questioned and counseled in a consistent way.

The current study had some limitations. The reasons for non-participation could be obtained only from women whose telephone numbers were available (35% of all eligible women). Telephone numbers were not part of the data provided in the local registries and had to be retrieved using commercial software. Hence, many women could not be contacted for counseling. The time frame in which clients had to be contacted was limited to 2 weeks, and not all women could be counseled in this time frame. Furthermore, all clients who were asked for their reasons for non-attendance were counseled. Therefore, we could not obtain participation rates for non-counseled women relative to their reasons for non-attendance. The study endpoint was participation within 3 months after the reminders were sent. Hence, we could not show how telephone counseling affects women's attitudes toward mammography screening over longer terms. The study was conducted in a rural area. Most stated reasons against participation should hold for urban as well as rural areas. The unavailability of means of transportation, however, might be less common in an urban population. All interviews were conducted by a single staff member. Although the interview was scripted, personal biases cannot be ruled out. Lastly, the study mainly provides descriptive data on non-participation while falling short on offering solutions for overcoming most of the barriers that lead to it. We did not compare other methods to increase participation apart from telephone counseling.

5. Conclusions

The majority of women who did not attend German MSP stated specific reasons. Depending on their respective reasons for non-attending the susceptibility to counseling varied greatly. Among these reasons, participation in gray screenings was the most common, followed by time problems. Women who reported not having received the invitation or could not make the proposed examination date had the most benefit from telephone consultation. Similarly, issues concerning the proposed examination date could be resolved by counseling. Understanding these reasons may help to address common organizational obstacles and personal reservations.

Moreover, the prevalence of gray screening should be reduced to improve participation in organized mammography screening.

Author Contributions: Conceptualization: S.F. and W.H.; Methodology: W.H.; Data curation: M.D.; Formal analysis: K.W.; Writing: S.F. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The local Ethics Committee of the Ernst-Moritz-Arndt University of Greifswald and the Data Protection Officer of the state of Mecklenburg-Vorpommern, approved the study.

Informed Consent Statement: All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the Ernst-Moritz-Arndt University of Greifswald no. BB14/07 approved 27th of February 2007.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available to ensure the protection of personal data.

Conflicts of Interest: The authors declare no conflict of interest.

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Ergebnisse:

Insgesamt konnten in der Kohorte 1494 Frauen befragt und beraten werden. Von diesen wurden, unter Berücksichtigung der Nennung mehrere Gründe je Klientin, 3280 Gründe für die Nichtteilnahme angegeben. Die Teilnahmequote drei Monate nach Versenden des Erinnerungsschreibens in der Gruppe der Beratenen war signifikant höher als in der 2486 Frauen umfassenden Kontrollgruppe (Teilnahmequote Kontrollgruppe 29% vs. Interventionsgruppe 46%; OR 2,12; 95%CI 1,85-2,42) (Abbildung 4).

Es konnten spezifische Gründe identifiziert werden, die für eine Nichtteilnahme am Mammographiescreening eine Rolle spielen (Abbildung 5). Insbesondere die Inanspruchnahme anderer Brustkrebsvorsorgemaßnahmen wie Mammographie außerhalb des Screenings, gynäkologische Untersuchungen und Selbstabtastung waren für 52% der Untersuchten (770 Frauen) die häufigsten Gründe für eine Nichtteilnahme. Zeitliche (27%; 396 Frauen) und gesundheitliche Gründe (17%; 258 Frauen) wurden deutlich seltener genannt. Die Angst vor dem Ergebnis der Untersuchung (8%; 122 Frauen), der Verlust des Vertrauens in das medizinische System (6%; 84 Frauen) und das persönliche Inanspruchnahmeverhalten (5%; 70 Frauen) scheinen nur eine untergeordnete Rolle zu spielen. Nicht klassifizierbare Gründe wurden von 17% der Befragten (251 Frauen) angegeben (Abbildung 5) (Abbildung 6).

3.3 Beeinflussbarkeit der Gründe für die Nichtteilnahme durch telefonische Beratung

Zudem wurden für die Subgruppen der angegebenen Gründe die Teilnahmequote und die Odds-ratio (OR) berechnet (Abbildung 7) (Tabelle 1). Diese lässt Aussagen darüber zu, in wie weit ein Hinderungsgrund durch eine Beratung beeinflusst oder beseitigt werden kann. Hierfür wurden innerhalb der Interventionsgruppe die Teilnahmequoten derer, die einen bestimmten Grund angegeben hatten, mit dem Quoten derer, die diesen Grund nicht angegeben hatten verglichen. Eine OR kleiner 1 lässt auf eine Beeinflussbarkeit des Grundes schließen. Bei Werten größer 1 liegt keine

Beeinflussbarkeit vor. Hierbei zeigte sich eine besonders hohe Beeinflussbarkeit bei Frauen, die den primär angegebenen Untersuchungstermin als unpassend erachtet und deshalb nicht teilgenommen hatten (Teilnahmequote nach Beratung 70%; OR 0,38 ; 95%KI 0,27-0,52; p<0,0001). Ähnlich hohe Werte wurden bei den Frauen beobachtet, die die Einladung nicht erhalten, nicht beachtet oder nicht als glaubwürdig eingestuft hatten (Teilnahmequote nach Beratung 69%; OR 0,32; 95%KI 0,23-0,45; p<0,0001). Auch zeitliche Gründe (nicht berufliche) (60% Teilnahmequote nach Beratung; OR 0,45; 95%KI 0,34-0,61; p<0,0001) konnten durch eine Beratung, die auch die Möglichkeiten der individuellen Terminvereinbarung aufzeigte, gut beeinflusst werden. Eine geringe Teilnahmequote weit unterhalb derer der Kontrollgruppe (29%) zeigte sich in der Subgruppe, die Vorsorgeuntersuchungen nicht mit dem persönlichen Inanspruchnahmeverhalten in Einklang bringen konnte (13% Teilnahmequote nach Beratung; OR 2,81; 95%KI 1,31-6,01; p=0,0078). Ebenfalls unter dem Wert der Kontrollgruppe waren diejenigen Frauen, die aufgrund Ihres Glaubens in die eigene Gesundheit, diese Untersuchung für unnötig erachteten (23% Teilnahmequote nach Beratung; OR 2,01; 95%KI 1,40-2,90; p=0,0002).
Die Beeinflussbarkeit eines Hinderungsgrundes ist in Abbildung 8 dargestellt. Diese zeigt die Odds-ratio für eine Nicht-Teilnahme in Abhängigkeit vom genannten Grund.

3.4 Teilnahmequoten bei Mehrfachnennungen

Da die systematische Befragung Mehrfachnennungen von Gründen ausdrücklich zuließ wurde auch analysiert, ob ein Zusammenhang zwischen der Teilnahme und der Anzahl der genannten Gründe besteht. Von den 1494 Frauen wurden insgesamt 3280 Gründe für die Nichtteilnahme angegeben, im Durchschnitt 2,20 Gründe je Klientin (Tabelle 2) (Abbildung 9). Minimal wurde 1 Grund angegeben, maximal 7 Gründe. Hierbei ist zu beachten, dass die Klientinnen auch die Möglichkeit hatten, keinen Grund anzugeben; diese wurden aus der Studie ausgeschlossen. Erwartungsgemäß zeigte sich, dass die Teilnahmequote in den Gruppen am geringsten war, die 5,6 oder 7 verschiedene Gründe für die Nichtteilnahme angaben (durchschnittlich 26%). Die höchsten Teilnahmequoten wurden in der Gruppe die 2 Gründe (55%) und 3 Gründe (44%) angegeben hatten.

Bemerkenswert ist eine niedrigere Quote an Teilnehmerinnen, die einen einzelnen Grund genannt hatten (42%) (Abbildung 10).
Fielen mehrere der angegebenen Gründe in die selbe Kategorie, so wurden sie wie die Angabe eines einzelnen Grundes gezählt. Abbildung 11 zeigt die Teilnahmehäufigkeit in Abhängigkeit der Anzahl der genannten Gründe .

3.5 Teilnahmequoten in Abhängigkeit vom Alter

Die Einflüsse des Alters der Klientinnen auf die Bereitschaft zur Teilnahme wurden ebenfalls untersucht. Als Alter der Frauen wurde in der Interventionsgruppe das Alter zum Beratungszeitpunkt ermittelt. Für die Kontrollgruppe galt das Alter zum Stichtag (04.05.2008)Abbildung 12. Die Altersstruktur der Kontroll- und Interventionsgruppe unterschied sich nicht (Durchschnittsalter Kontrollgruppe 59,57 Jahre vs. 59,22 Jahre in der Interventionsgruppe) (Abbildung 13). Der vergleichsweise hohe Anteil von 68-jährigen (14,30% in der Kontrollgruppe vs. 12,64% in der Interventionsgruppe) ergab sich aus der Tatsache, dass in dieser frühen Einladungsrunde bevorzugt Frauen eingeladen wurden, die bei einer späteren Einladung, aufgrund des Überschreitens der Altersobergrenze für das Screening, keine Untersuchung mehr erhalten hätten können. Bei der Analyse der altersspezifischen Teilnahmequoten zeigten sich besonders hohe Steigerungsquoten in der Gruppe der 67-jährigen (Teilnahmequote nach Beratung 52% OR 3,84; 95%KI 2,05-7,18; signifikant). Im Durchschnitt ergab sich eine altersgruppenspezifische OR von 2,20 (Abbildung 14). Nicht signifikante Werte sind in Abbildung 14 rot gekennzeichnet. Ein linearer Zusammenhang zwischen Alter und Teilnahmequote konnte nicht gefunden werden. Insgesamt konnte in jeder Altersgruppe eine Steigerung in der Teilnahmequote durch telefonische Beratung verzeichnet werden.

4. Diskussion

Diese populationsbasierten Interventionsstudien untersuchten die Möglichkeiten der Steigerung der Teilnahmequote am landesweiten Mammographie-Screening-Programm durch telefonische Beratung, die Gründe für eine Nichtteilnahme an diesem und die Beeinflussbarkeit der genannten Gründe durch eine Barriere-spezifische Beratung (45). Sie führt damit unterschiedliche Beobachtungen zusammen.

Es existieren zahlreiche Untersuchungen, die zeigen, dass eine telefonische Beratung die Teilnahmequote im Vergleich zu wiederholten schriftlichen Einladungen steigern kann(13,18,19,46). Diese Studie bestätigt die Wirksamkeit einer telefonischen Beratung zusätzlich zu einer schriftlichen Einladung. Die Teilnahmequote bei Frauen, die einer schriftlichen Ersteinladung nicht nachgekommen waren war mit 45,85% signifikant höher, wenn sie telefonisch beraten werden konnten (OR 2,12; 95%CI 1,85-2,42; signifikant). Diese Steigerungsrate entspricht den Beobachtungen aus anderen Studien(11,12,14,16,17,20,47) die eine Steigerung der Teilnahme um 10% - 41% absolut beschrieben. Eine signifikante Steigerung der Teilnahmequote konnte auch in der durchgeführten Studie (Paper 1) für die beobachtete Kohorte bestätigt werden.

Die Hauptgründe, die als Grund für eine Nichtteilnahme an Mammographie-Screening-Programmen in anderen Studien(31–39) identifiziert werden konnten, wurden auch in der hier untersuchten Bevölkerung gefunden. Der größte Teil (51,54%) der beratenen Nichtteilnehmerinnen hatte angegeben, Maßnahmen zur Brustkrebsvorsorge außerhalb des nationalen MSP ergriffen zu haben. Dies deckt sich zu großen Teilen mit den Daten von Baré (2003)(31) der einen hohen Anteil von Frauen, die Selbstabtastung und gynäkologische Untersuchungen in Anspruch nehmen, unter den Nichtteilnehmerinnen gesehen hatte. Eine neuere Arbeit von Moutel et al. (48) aus dem Jahr 2014 stellt einen Zusammenhang zwischen der geringen Teilnahmequote beim organisierten Screening mit der hohen Zahl der außerhalb des Screenings durchgeführten Mammographien her. Diese Aussage konnte in dieser Studie bestätigt werden. Grund hierfür kann, wie auch in der Vorarbeit beschrieben, der niedrigschwellige Zugang zu Mammographien gepaart

mit der sehr hohen Quote an krankenversicherten sein. Nähme man diejenigen Frauen, die aufgrund von vorangegangenen Mammographien aus der Studie ausgeschlossen wurden, noch mit in die Berechnung auf, so ergäbe sich noch ein weit höherer Anteil von Nichtteilnehmerinnen, die in die Kategorie „Graues Screening“ fielen. Diese Beobachtung verdient deswegen besondere Aufmerksamkeit, da das organisierte Mammographie-Screening-Programm eine höhere Untersuchungs- und Befundungsqualität bietet, als außerhalb des Programms durchgeführte Mammographien (48). Neben zeitlichen (26,51%) wurden auch gesundheitliche Gründe (17,27%) häufig genannt.

Eine Analyse der Beeinflussbarkeit der Hinderungsgründe durch die telefonische Beratung, wurde nach Kenntnis der Autoren bisher in keiner Studie durchgeführt (pubmed Recherche). In dieser Analyse wurden die Quotenverhältnisse für die Teilnahme am Screening in Abhängigkeit vom angegebenen Grund untersucht. Hierfür wurden innerhalb der Interventionsgruppe die Teilnahmequoten derer, die einen bestimmten Grund angegeben hatten, mit dem Quoten derer, die diesen Grund nicht angegeben hatten verglichen. Besonders gut ließ sich das Teilnahmeverhalten von Frauen beeinflussen, die den angegebenen Termin als unpassend erachtet hatten (OR 0,38 ; 95%KI 0,27-0,52; $p<0,0001$), wie auch diejenigen die die Einladung nicht erhalten, oder nicht beachtet hatten (OR 0,32; 95%KI 0,23-0,45; $p<0,0001$). Eine gute Beeinflussbarkeit ergab sich auch in der Gruppe, die zeitliche Schwierigkeiten hatten, am Screening teilzunehmen (OR 0,45; 95%KI 0,34-0,61; $p<0,0001$).
Andere Frauen profitieren nicht von der Beratung. Hierzu zählt insbesondere die Gruppe, die medizinische Leistungen nur im Krankheitsfall in Anspruch nimmt (Grund „Inanspruchnahmeverhalten“). In dieser Gruppe ergab sich ein OR von 2,81 (95%KI 1,31-6,01; $p=0,0078$). Gleichzeitig ist auch der Glaube an die eigene Gesundheit (OR 2,01; 95%KI 1,40-2,90; $p=0,0002$) unbeeinflussbar. Beim grauen Screening ergaben sich keine signifikanten Unterschiede (OR 1,06; 95%KI 0,84-1,33; nicht signifikant).

Angesichts dieser Ergebnisse könnte sich eine zukünftige telefonische Intervention auf organisatorische Fragen beschränken, wenn das Ziel eine möglichst große Erfolgsquote

ist. Möchte man den häufigst genannten Grund für die niedrige Teilnahmequote beseitigen, so muss eine Möglichkeit gefunden werde, das graue Screening zu reduzieren. Eine telefonische Intervention scheint hierfür allerdings kein geeignetes Mittel zu sein.

Die Aussagekraft der Studie wird durch einige Faktoren eingeschränkt. Die Gründe für die Nichtteilnahme konnten nur von Frauen erfragt werden, deren Telefonnummern herausgefunden werden konnten. Diese Information war nicht in dem, zur Verfügung gestellten Datensatz vorhanden und musste mit Hilfe einer kommerziellen Software recherchiert werden (Trefferquote 35%). Es gibt also eine große Menge von Frauen, die nicht befragt und beraten werden konnte. Das Zeitfenster, welches zur Kontaktaufnahme mit den Klientinnen zur Verfügung stand war auf 2 Wochen beschränkt, so dass einige in diesem Zeitraum nicht erreicht werden konnten.
Als Endpunkt wurde die Teilnahme am Mammographiescreening, drei Monate nach dem Erinnerungsschreiben gewählt. Langzeitbeobachtungen, welche Einflüsse eine spezifische Beratung auf das Teilnahmeverhalten in den darauf folgenden Monaten und Jahren hat, waren nicht möglich.

5. Schlussfolgerung:

Es konnte gezeigt werden, dass die telefonische Beratung ein geeignetes Mittel darstellt, die Teilnahmequote am Mammographie-Screening zu verbessern. Es existieren, außer individuellen Gründen, auch häufige spezifizierbare Gründe die von Nichtteilnehmerinnen genannt werden. Unter diesen ist die Teilnahme am sogenannten „grauen Screening“ der häufigste, der Frauen von einer Teilnahme am Programm abhält. Frauen, die angaben, die Einladung nicht erhalten zu haben oder den in der Einladung angegebenen Termin als unpassend ansahen, konnten am meisten von der telefonischen Beratung profitieren. Die Kenntnis dieser Gründe könnte in Zukunft helfen, im Rahmen der Öffentlichkeitsarbeit spezifische Vorbehalte zu adressieren und im Rahmen des Einladungsverfahrens eine bessere Akzeptanz der Screeninguntersuchung erzeugen. Eine weitere Möglichkeit, die Teilnahmequote zu steigern ist die Reduktion des grauen Screenings, wobei eine individuelle telefonische Beratung hierzu nicht geeignet ist.

6. Abbildungsverzeichnis:

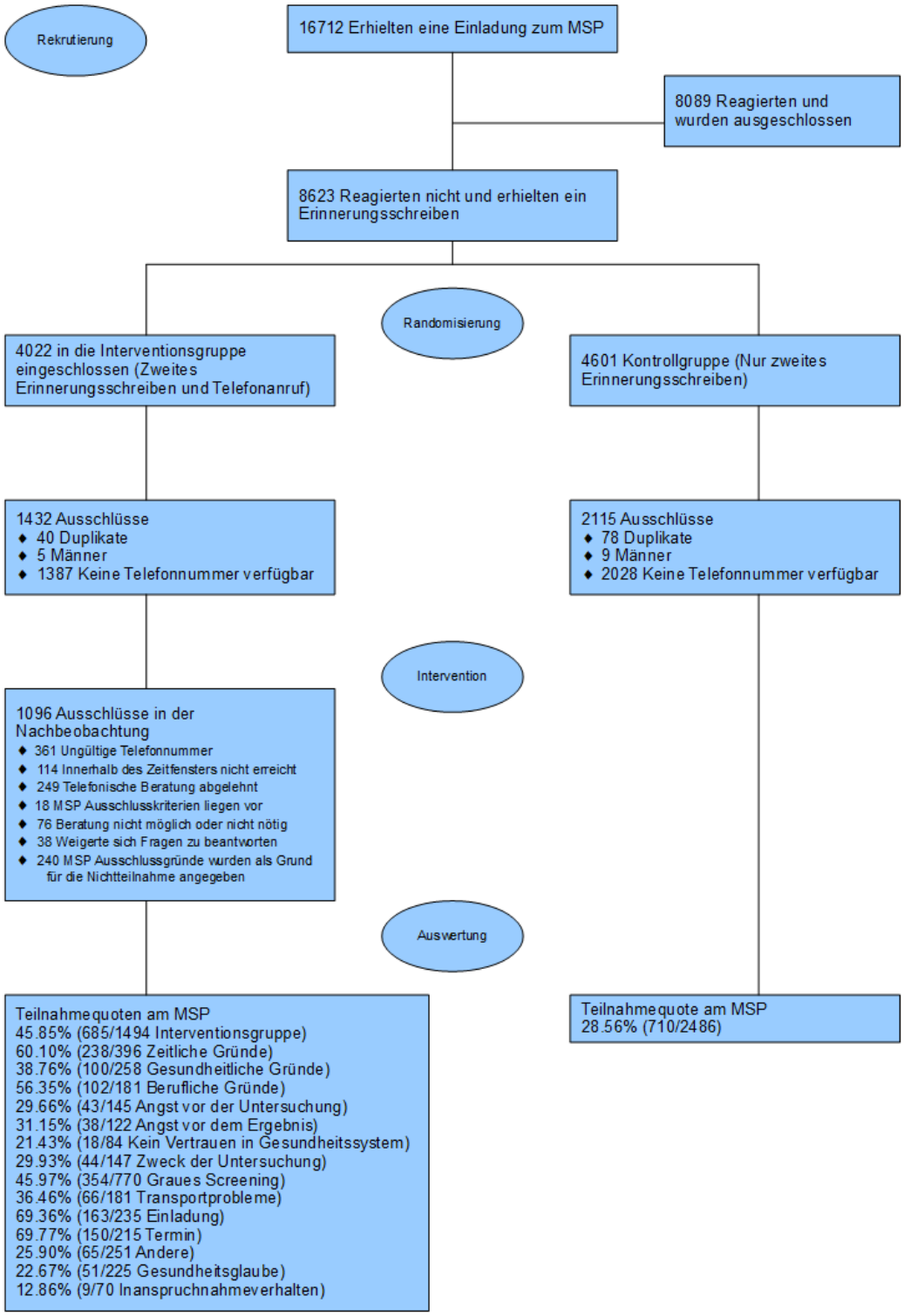

Abbildung 1: Consort Statement

★ STELLA

Studie zur Erhöhung der Teilnahmequote beim Mammographie-Screening in Mecklenburg-Vorpommern durch geleitete telefonische Anrufe

Sehr geehrte Damen,

vor kurzem wurden Sie zu einer Brustkrebs-Vorsorgeuntersuchung (Mammographie-Screening) eingeladen. Wir sind ständig bemüht, dieses landesweite Programm zu verbessern. Zu diesem Zweck interessieren wir uns für die Gründe, aus denen manche von Ihnen diese Untersuchung nutzen und sich andere entscheiden, nicht an dieser Untersuchung teilzunehmen.

Ihr Einverständnis vorausgesetzt wird etwa jede 2. Empfängerin dieses Briefes durch eine Mitarbeiterin der Universität in den nächsten Tagen telefonisch kontaktiert. Die Telefonnummer wird dazu aus dem öffentlichen Telefonverzeichnis ermittelt.

Da wir Ihre Bedürfnisse näher kennen lernen möchten, würden wir uns freuen, wenn Sie einige unserer Fragen beantworten würden. Zusätzlich wollen wir Ihnen die Möglichkeit geben, während des Telefonats Fragen zu stellen, weitere Informationen zu erhalten oder Ihre Kritik anzubringen. Unsere Mitarbeiterin wurde hierzu speziell ausgebildet.

Ihre Teilnahme ist freiwillig. Sollten Sie das Telefonat nicht wünschen, sagen Sie dies unserer Mitarbeiterin bitte zu Beginn des Gesprächs. Es werden Ihnen dadurch keinerlei Nachteile im Rahmen dieses Programms oder anderweitig entstehen. Die Daten werden pseudonymisiert im Rahmen einer klinischen Studie erfasst, so dass keine Rückschlüsse auf Ihre persönlichen Angaben möglich sind.

Das Telefongespräch wird etwa 15-20 Minuten dauern. Durch Ihre Mitarbeit können Sie uns helfen, in Zukunft noch besser über die Brustkrebs-Vorsorge zu informieren.

Über Ihre Bereitschaft zur Mitarbeit würden wir uns freuen.

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Abbildung 2: Beileger zum Einladungsschreiben

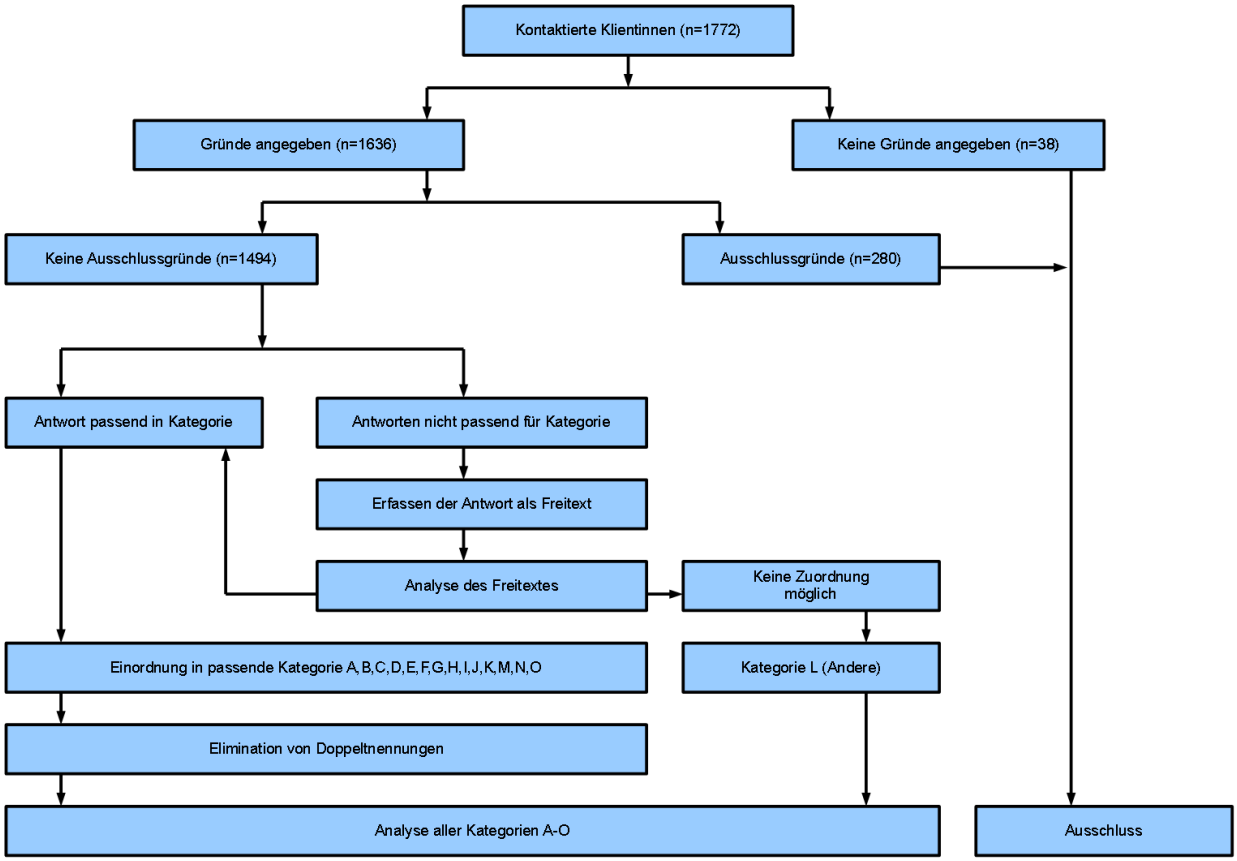

Abbildung 3: Flussschema zum Vorgehen bei unklarer Zuordnung des Grundes für die Nichtteilnahme

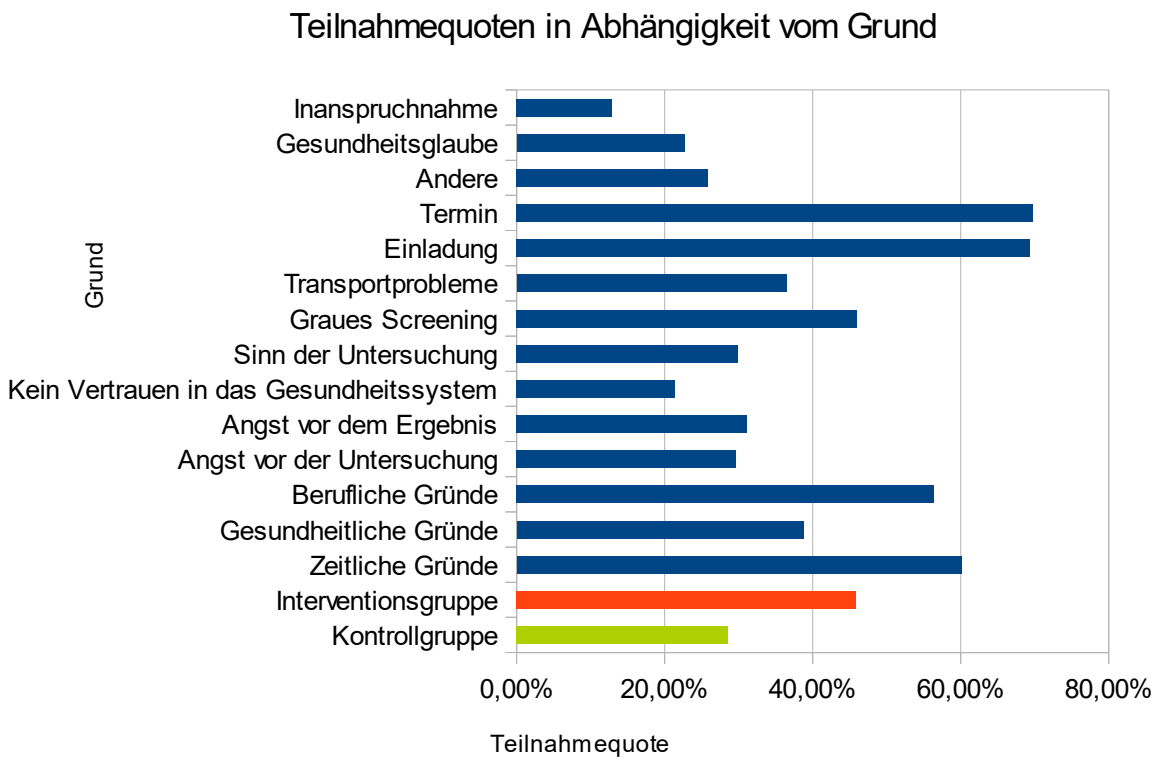

Abbildung 4: Teilnahmequoten in Abhängigkeit vom genannten Grund

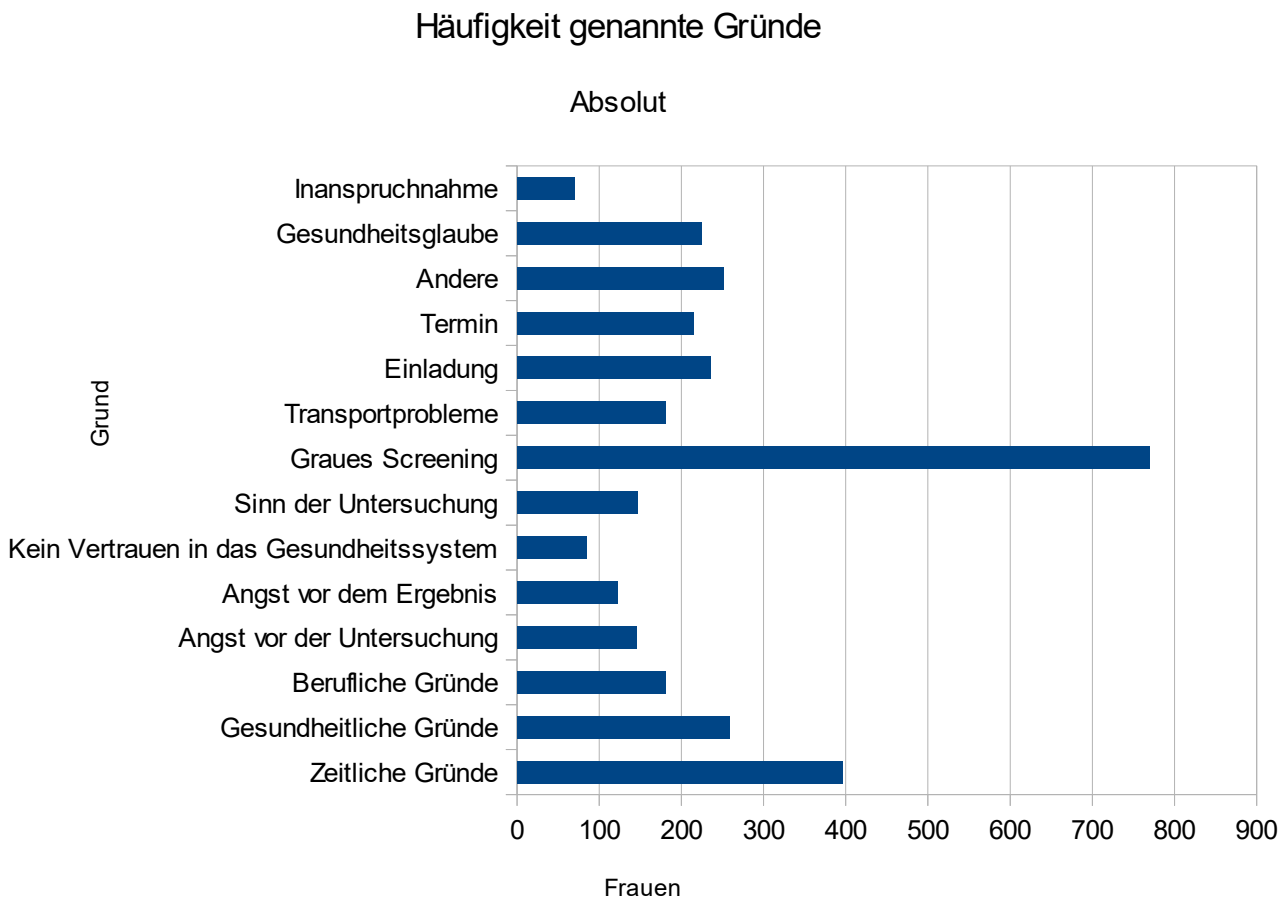

Abbildung 5: Häufigkeit der genannten Gründe absolut

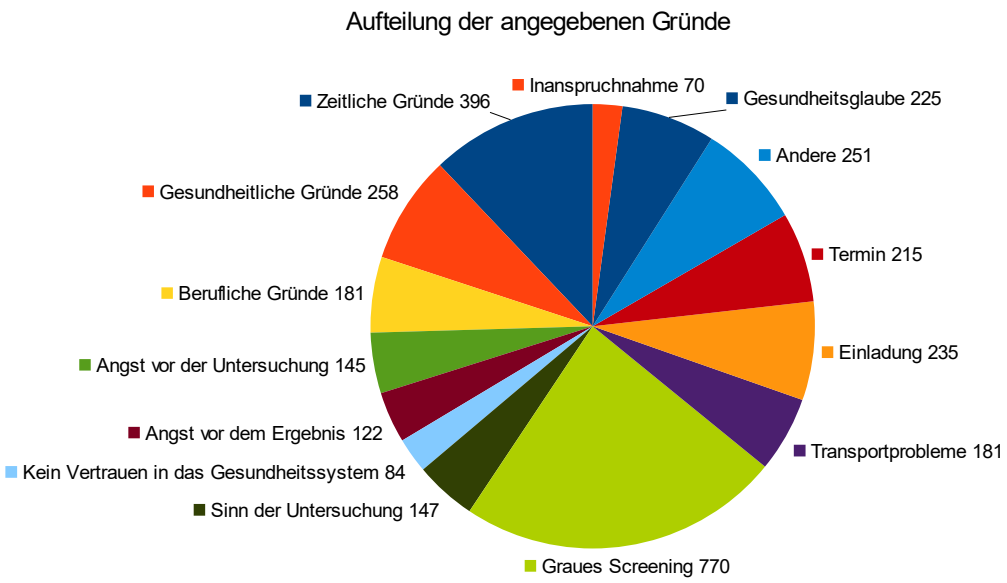

Abbildung 6: Verteilung der Gründe für die Nichtteilnahme

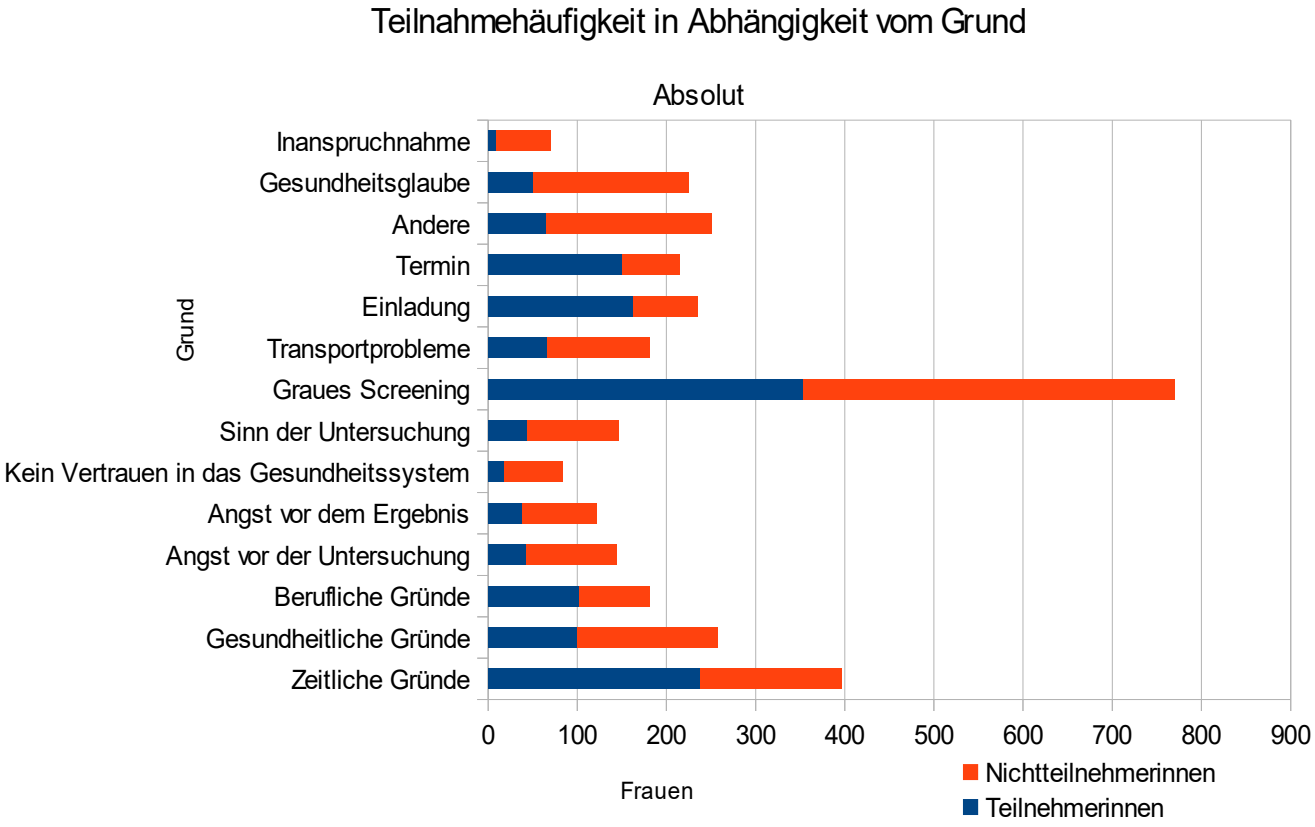

Abbildung 7: Teilnahmehäufigkeit nach Beratung in Abhängigkeit vom Grund absolut

	n	%	Teilnehmerinnen	Nichtteilnehmerinnen	Teilnahmequote	OR	95%CI		P-Wert Intervention vs. Intervention
Kontrollgruppe	2486		710	1776	28,56%				
Interventionsgruppe	1494		685	809	45,85%				
Zeitliche Gründe	396	26,51%	238	158	60,10%	0,45	0,34	0,61	<0,0001
Gesundheitliche Gründe	258	17,27%	100	158	38,76%	1,13	0,83	1,54	0,4229
Berufliche Gründe	181	12,12%	102	79	56,35%	1,10	0,75	1,61	0,6372
Angst vor der Untersuchung	145	9,71%	43	102	29,66%	1,34	0,89	2,02	0,1628
Angst vor dem Ergebnis	122	8,17%	38	84	31,15%	1,01	0,69	1,67	0,7554
Kein Vertrauen in das Gesundheitssystem	84	5,62%	18	66	21,43%	1,72	0,95	3,12	0,0730
Sinn der Untersuchung	147	9,84%	44	103	29,93%	1,23	0,74	1,73	0,5835
Graues Screening	770	51,54%	354	416	45,97%	1,06	0,84	1,33	0,5974
Transportprobleme	181	12,12%	66	115	36,46%	1,18	0,83	1,68	0,3481
Einladung	235	15,73%	163	72	69,36%	0,32	0,23	0,45	<0,0001
Termin	215	14,39%	150	65	69,77%	0,38	0,27	0,52	<0,0001
Gesundheitsglaube	225	15,06%	51	174	22,67%	2,01	1,40	2,90	0,0002
Inanspruchnahme	70	4,69%	9	61	12,86%	2,81	1,31	6,01	0,0078
Andere	251	16,80%	65	186	25,90%	1,70	1,21	2,38	0,0020

Tabelle 1: Teilnahmequoten und Odds-ratio der Subgruppen im Vergleich

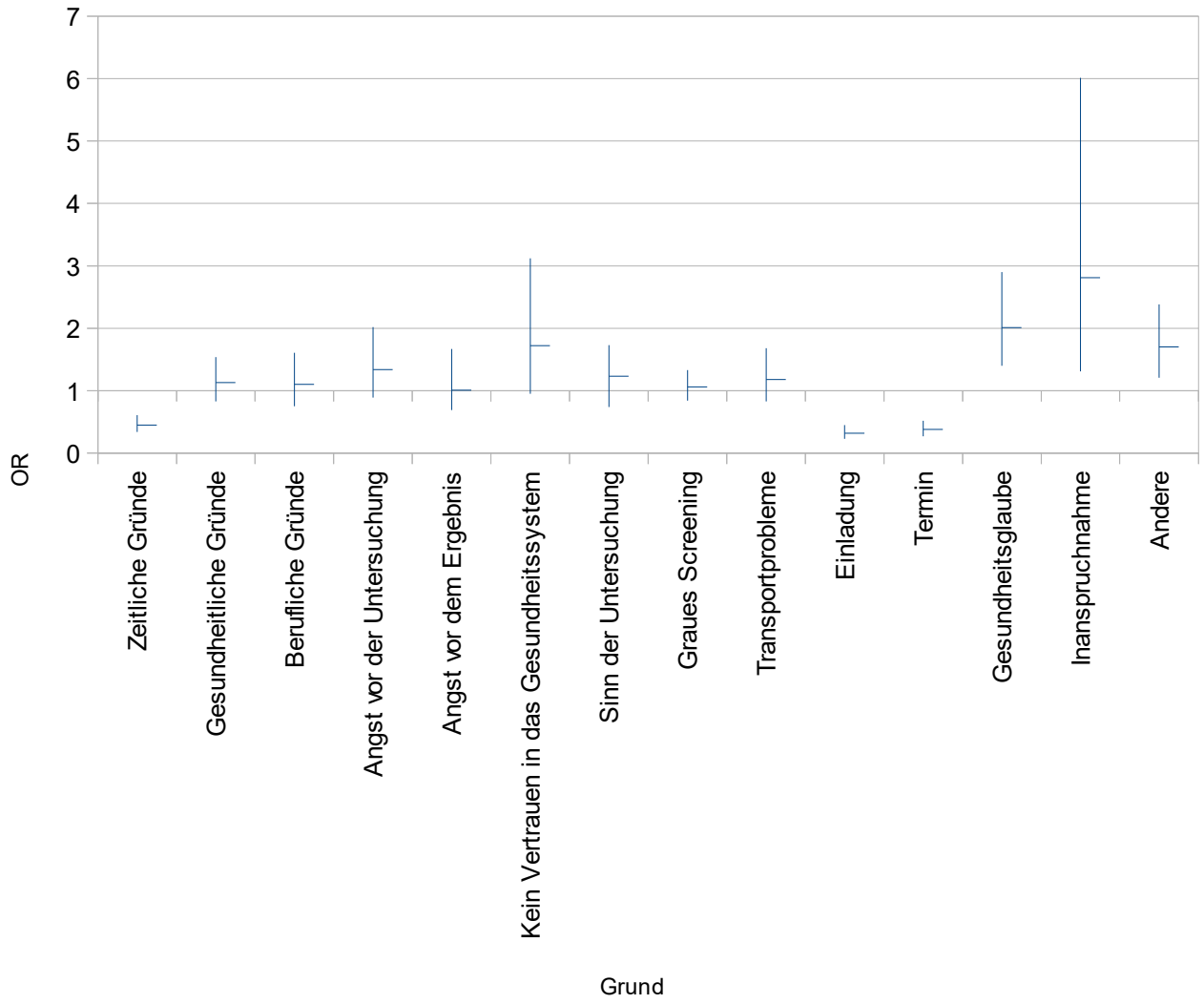

Abbildung 8: Odds-ratio für die Nichtteilnahme nach log-Regressionsanalyse

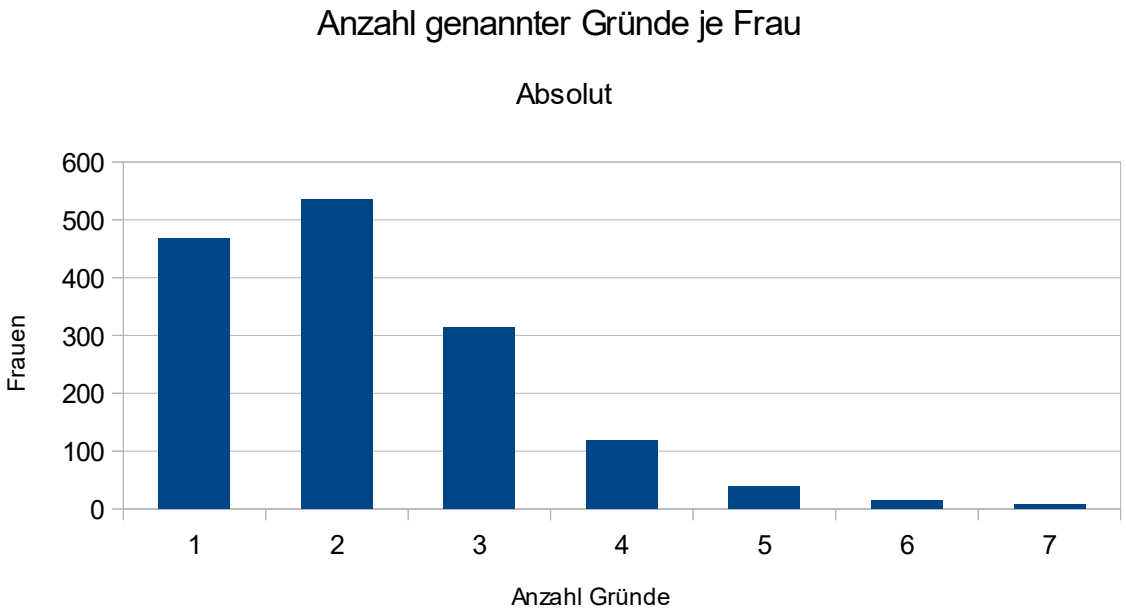

Abbildung 9: Anzahl genannte Gründe je Frau

Tabelle 2: Teilnahmequoten in Abhängigkeit von der Anzahl der genannten Gründe

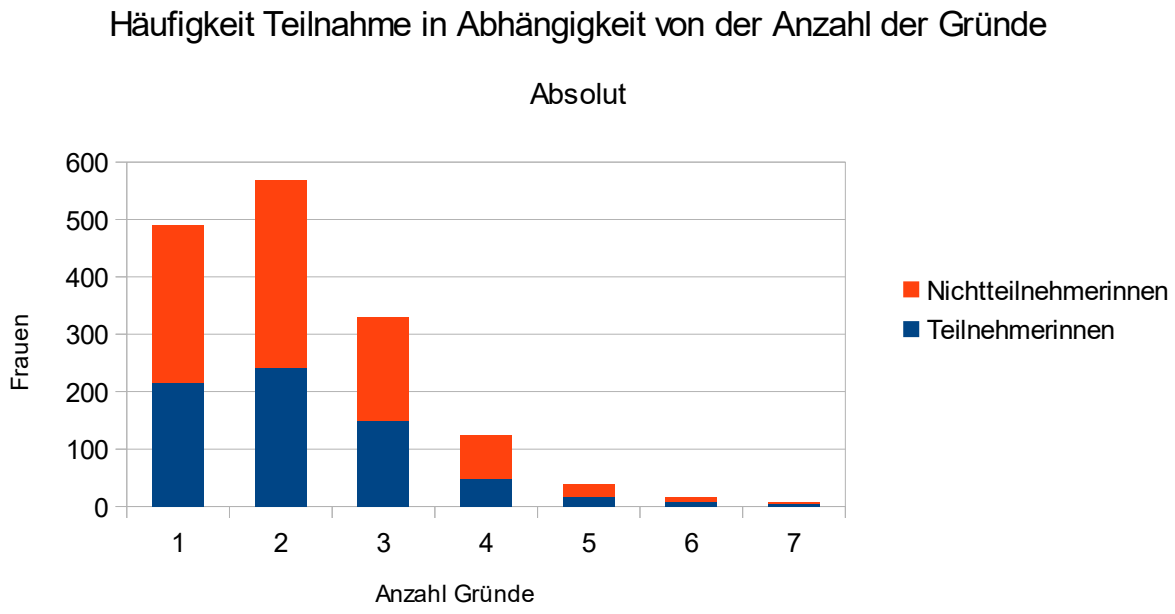

Abbildung 10: Häufigkeit der Teilnahme in Abhängigkeit von der Anzahl der genannten Gründe

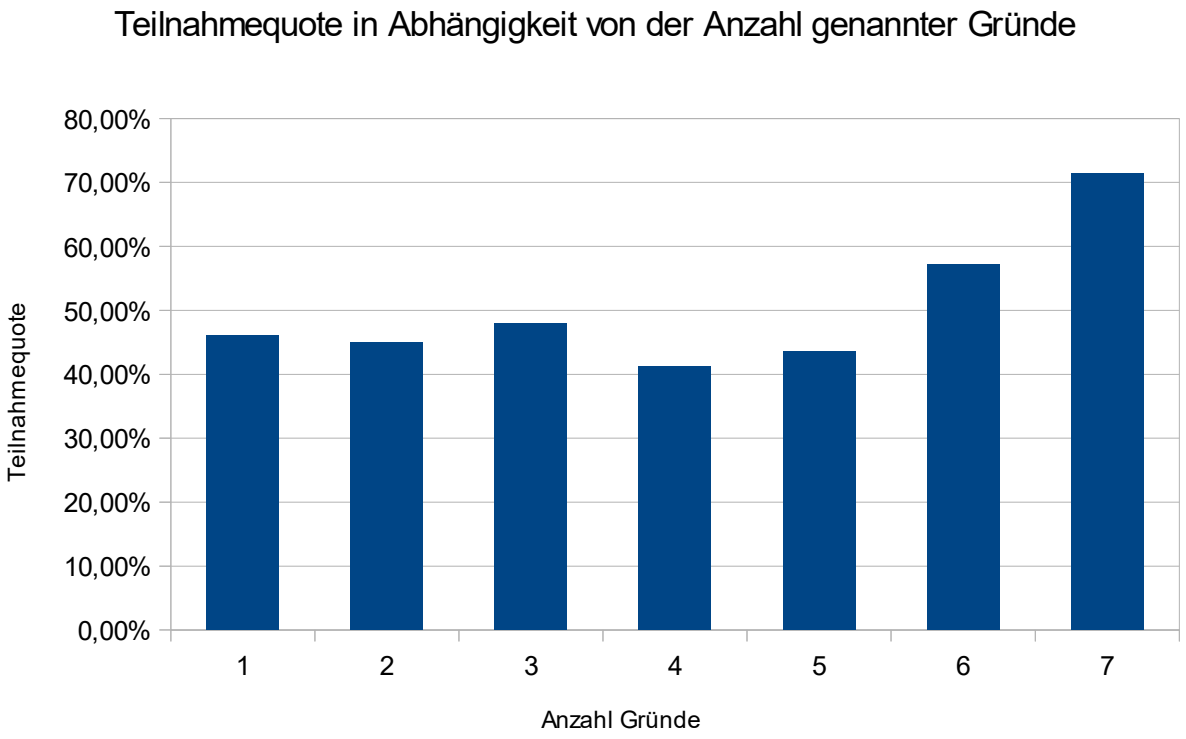

Abbildung 11: Teilnahmequote in Abhängigkeit von der Anzahl der genannten Gründe

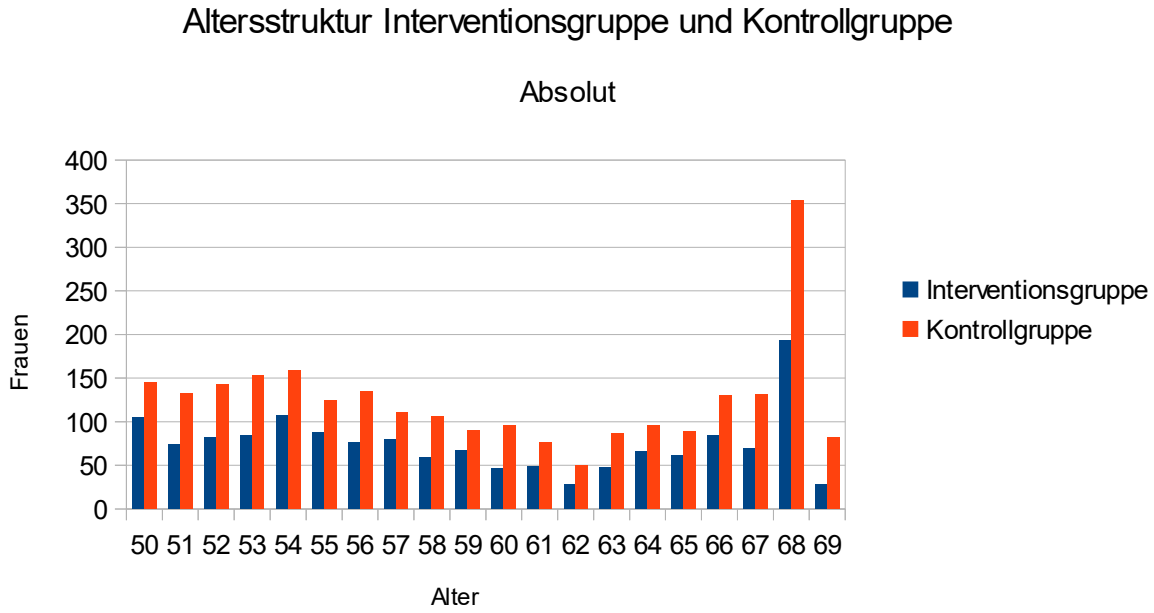

Abbildung 12: Altersstruktur Interventions- und Kontrollgruppe in absoluten Zahlen

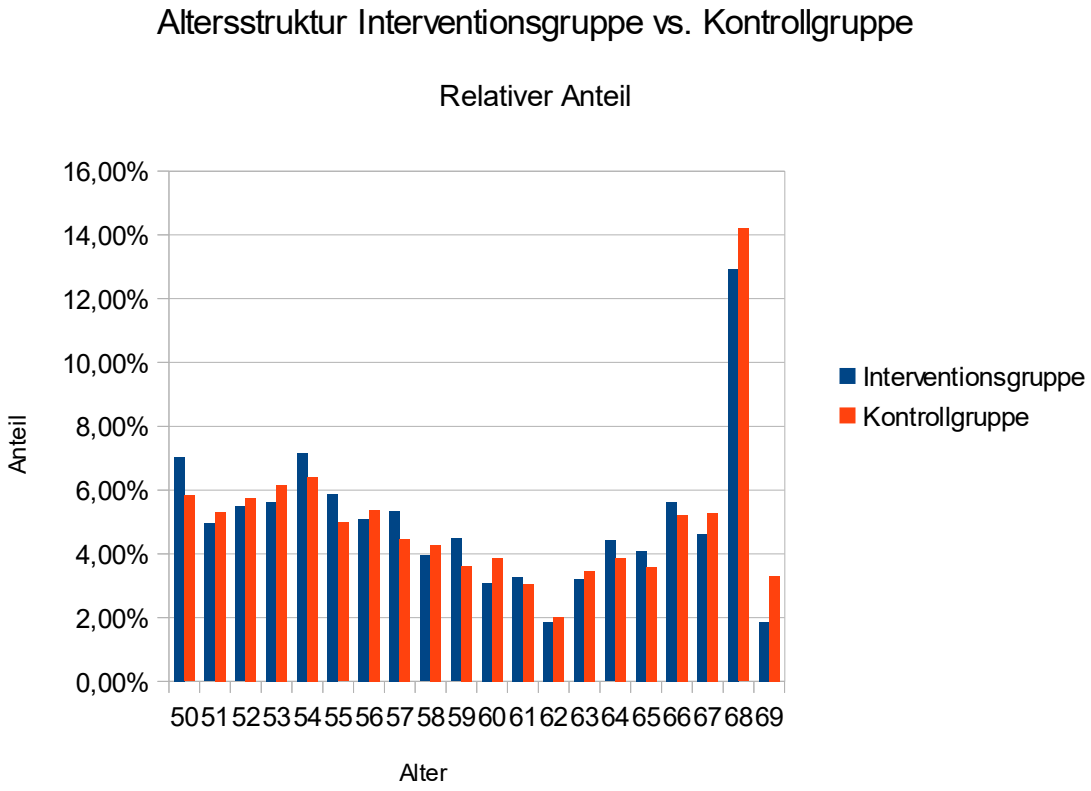

Abbildung 13: Altersstruktur Interventionsgruppe und Kontrollgruppe relativ

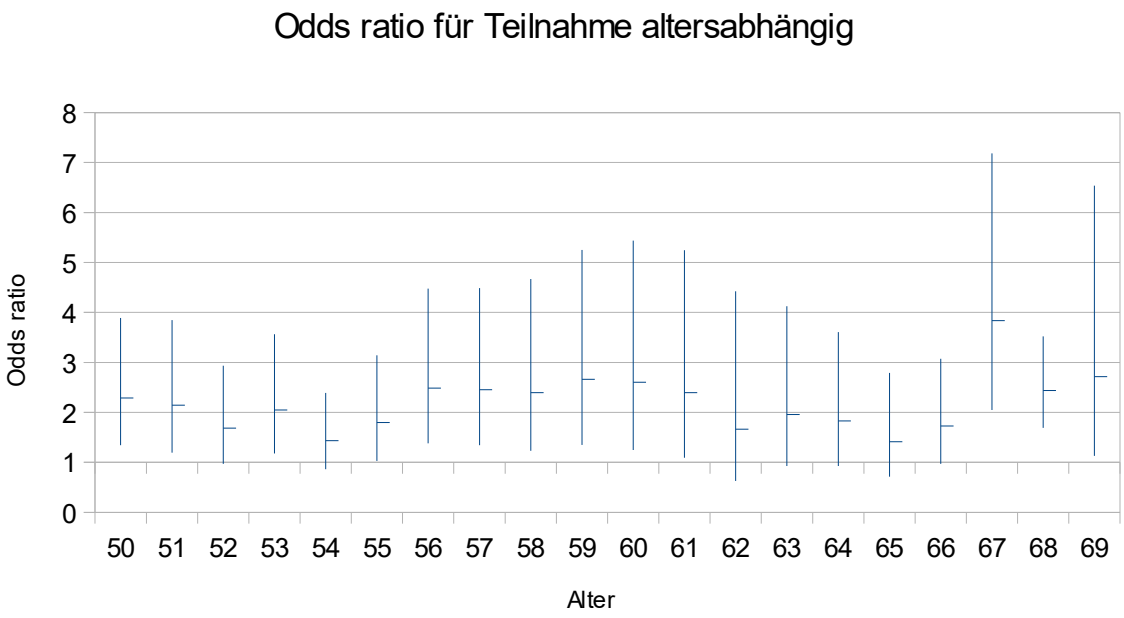

Abbildung 14: Odds Ratio für die Teilnahme altersabhängig

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