What do we know about who does and does not attend general health checks? Findings from a narrative scoping review

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Abstract

Background: General and preventive health checks are a key feature of contemporary policies of anticipatory care. Ensuring high and equitable uptake of such general health checks is essential to ensuring health gain and preventing health inequalities. This literature review explores the socio-demographic, clinical and social cognitive characteristics of those who do and do not engage with general health checks or preventative health checks for cardiovascular disease.

Methods: An exploratory scoping study approach was employed. Databases searched included the British Nursing Index and Archive, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Database of Systematic Reviews (CDSR) and Database of Abstracts of Reviews of Effects (DARE), EMBASE, MEDLINE, PsycINFO and the Social Sciences Citation Index (SSCI). Titles and abstracts of 17463 papers were screened; 1171 papers were then independently assessed by two researchers. A review of full text was carried out by two of the authors resulting in 39 being included in the final review.

Results: Those least likely to attend health checks were men on low incomes, low socio-economic status, unemployed or less well educated. In general, attenders were older than non-attenders. An individual’s marital status was found to affect attendance rates with non-attenders more likely to be single. In general, white individuals were more likely to engage with services than individuals from other ethnic backgrounds. Non-attenders had a greater proportion of cardiovascular risk factors than attenders, and smokers were less likely to attend than non-smokers. The relationship between health beliefs and health behaviours appeared complex. Non-attenders were shown to value health less strongly, have low self-efficacy, feel less in control of their health and be less likely to believe in the efficacy of health checks.

Conclusion: Routine health check-ups appear to be taken up inequitably, with gender, age, socio-demographic status and ethnicity all associated with differential service use. Furthermore, non-attenders appeared to have greater clinical need or risk factors suggesting that differential uptake may lead to sub-optimal health gain and contribute to inequalities via the inverse care law. Appropriate service redesign and interventions to encourage increased uptake among these groups is required.

Keywords: Health checks, Screening, Public health, Inequalities, Primary care

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Background

Anticipatory care [1] has increasingly been seen as a means by which the increasing demands of an aging population [2], growing numbers of people living with long term conditions, and persisting inequalities in health [3] may be addressed [4,5]. A key feature of such approaches are general and preventive health checks, defined as interventions which include a physical examination and/or an assessment of demographic and lifestyle risk factors which assess an individual’s current health or predict their chance of developing illness in the future [6]. These may be carried out for primary and secondary preventive purposes, as part of annual routine health check-ups required among older age groups [7], or embedded opportunistically within routine clinical encounters [8].

Regular community based general health check-ups are important for the early identification of risk factors for conditions such as heart disease, diabetes and stroke [9], as evidenced in the recent introduction of Health Check within the United Kingdom (UK) National Health Service (NHS). The evidence base to support such health checks rests predominantly on the known efficacy of the individual screening components subsumed within them. For example, recent National Institute for Health and Clinical Excellence (NICE) guidance on the prevention of cardiovascular disease points to the known effectiveness of interventions within health checks in relation to risk assessment, smoking, and physical activity [10]. Such preventive health strategies may therefore also provide a cost effective way of dealing with the causes of ill health before they manifest into serious long-term conditions.

Despite the potential importance and benefit of such health checks, their uptake is known to be largely suboptimal [11]. For example, data illustrating the implementation of the recent NHS Health Check in the UK has shown uptake rates of around 50% [12]. Furthermore, there is good reason to think that the pattern of uptake is likely to be differentially spread across socio-economic groupings and thus follow the inverse care law [13,14]: those who have greatest to benefit from the services are least likely to engage with them. Differential uptake therefore has the potential to exacerbate health inequalities [14]. Consequently, knowledge of the socio-economic correlates of high and low uptake is important if current services are to be appropriately adapted in order to rectify such inequity.

Community based health-checks which aim to effectively and efficiently screen maximum proportions of eligible populations, are likely to be complex interventions consisting of numerous potential parameters: method of invite, location, timing, and nature (duration and content) of the screening process. Consequently, the development of new forms of health check should consider the theoretical and empirical basis to support maximal uptake [15,16].

This exploratory scoping study aims to establish the nature and extent of current knowledge relating to the uptake and engagement with general health checks and preventative health checks for the risk factors of cardiovascular disease in particular, and thus contribute to the development of such a theoretical and empirical basis to informal future service development. In particular, it sought to address three fundamental questions:

1. What are the socio-demographic characteristics of those who do and do not engage with health checks?
2. What are their stated reasons for not attending health checks?
3. What are the clinical needs and risk factors of these non-attenders?

Methods

Establishing the state of knowledge with regard to a number of important but general questions requires a broad and inclusive review type rather than a highly focussed systematic review targeting a highly specified question around effectiveness. Scoping studies as defined by Arksey and O’Malley provide a structured but less restrictive alternative to the traditional systematic review of the literature [17]. They discuss four potential uses for a scoping study:

1. To examine the extent, range and nature of research activity
2. To determine the value of undertaking a full systematic review
3. To summarise and disseminate research findings
4. To identify research gaps in the existing literature” p6 [17].

This literature review followed an iterative scoping process which incorporated these objectives. The methodology was selected over the systematic review as its purpose was to explore the broad state of knowledge regarding attendance at general health checks rather than answer a clearly defined question. The breadth of potential studies and their heterogeneous nature meant that a scoping study with a narrative synthesis providing comprehensive representation of the evidence was more appropriate.

Search strategy

A search of bibliographic databases did not identify any existing systematic review which focused specifically on this topic, and a decision was made to develop an alternative search strategy designed specifically for the project.
Types of studies
This review considered both quantitative and qualitative studies including, but not limited to: project evaluations, randomised controlled trials, cohort studies, experimental or quasi-experimental trials, uncontrolled trials, systematic reviews, meta-analyses and studies using evaluation methodology such as the theory of change. Inclusion and exclusion criteria were developed using the 'population, intervention, comparison and outcome' (PICO) acronym as a framework [18], and are detailed in Table 1. Differences in the delivery of health care systems may mean that findings from studies in underdeveloped countries may not be relevant to the context of this project. This resulted in the decision to restrict studies to developed countries. Similarly, studies where health insurance was not controlled for were excluded from the review. Findings were restricted to papers on general or preventive health checks for the risk factors of cardiovascular disease, as other disease specific screening programmes (for example breast screening) have their own intricacies with barriers which are better understood and findings which are not always transferable. Papers on geriatric annual health checks were excluded as these were less likely to be of a preventive nature due to the age group and focused more on functionality and ability to live independently than clinical or lifestyle risk factors. Some papers which were retrieved considered general health checks and disease specific screening within the same study. Therefore, papers were included if they contained both disease specific AND general heart health checks, but excluded if disease specific (other than heart/cardiovascular disease) screening was the main focus of the paper.

Databases used
The databases used for the review were the British Nursing Index and Archive, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Database of Systematic Reviews (CDSR) and Database of Abstracts of Reviews of Effects (DARE), EMBASE, MEDLINE, PsycINFO and the Social Science Citation Index (SSCI). A wide variety of databases were chosen to allow the complex concept of 'uptake of services' to be explored from a number of different disciplines. Searches were performed on each database individually to improve functionality and allow search terms and limits to be amended from the original template (Table 2) to meet each database's specifications. Specific database search strategies and terms are available from the authors. Given that predictors of uptake are likely to change over time as cultures, values and services change, a judgement was made to exclude older studies. A subjective judgment was made to include papers published from 1996 onwards.

Selection process
The search and review procedure was conducted systematically and is outlined below with the initials of the researchers involved alongside:

- Ran search in databases individually (RD)
- Removed duplicates within databases (RD)
- Removed duplicates between databases (RD)
- Papers screened for relevance by title (RD)
- Papers independently screened for relevance by abstract (RD and CM)
- Meeting to discuss agreement (RD, CM, BW)

Table 1 Inclusion & exclusion criteria

| Inclusion Criteria | Exclusion Criteria |
|--------------------|--------------------|
| **Population:**    | **Population:**    |
| Western/developed countries     | Children           |
| Hard to reach populations      |                     |
| High risk groups               | Disease-specific health checks/screening (other than heart disease) |
| **Intervention:**             | **Intervention:**   |
| General health checks          | Geriatric annual health checks |
| Heart disease health checks    |                     |
| General/Heart AND other disease-specific health check |                     |
| Studies whose primary outcome was to increase uptake |                     |
| Studies where uptake was documented (of the above interventions) |                     |
| **Control:**                 | **Control:**       |
| Control group not necessary   | Studies from the developing world |
| **Outcome:**                 | **Limits:**        |
| Initial uptake of screening and/or | Non-English language papers |
| Long term engagement with services | Non-empirical opinion papers |
|                                  | Papers published pre 1980 |
What are the socio-demographic characteristics of those who do and do not engage with health checks?

Studies consistently indicate that males are less likely to engage with health checks or screening and to endorse periodic health examinations than females [20-28]. This difference in rates of non-attendance between males and females ranged from 8% to 19% in those invited for a health check at General Practice [21,23,24]. In community based drop-in sessions, women were more likely to self-present than males, with the proportion of attenders at least 60-65% female [20,22]. Additionally, 11% of men compared to 6% of women did not endorse periodic health examinations [28]. Two other studies found no difference in attendance rates by gender [29,30].

In general, attenders at health checks are older than non-attenders [20-23,25,31-35], although some studies found no association between age and attendance [29,30,36-39]. In many cases the demographics of engagers were dependent on the targeting strategy of the intervention; for example where the service was only offered to a particular age group. Some of the included studies were targeted specifically at older adults while others were offered to an entire adult practice population. Although there was a tendency for attenders to be older than non-attenders, the heterogeneous nature of the study methodologies meant that it was difficult to define an optimum age for uptake. Indeed, the relationship between age and participation may not be linear. For example, participation in a health examination after completion of a health interview in the Netherlands followed a curve which rose with increasing age until 60 then declined significantly with any age above this [40].

Individuals were found to be less likely to attend if they had low socio-economic status [23,33,34,36,38,40,41]. Defining which socio-economic/demographic characteristics differentiate between attenders and non-attenders was complicated by the numerous ways social status was reported in the literature. Some studies discussed social class, employment status, occupational training and level
of education or years spent in education independently; whilst others used the terms interchangeably or as proxy measures for each other. In general lower uptake was associated with low incomes [21,30-32,42], being unemployed [38,41,42] and lower educational attainment [22,25,27,31-34,41]. Although these terms may be closely related, one study found that each had an independent effect on the attendance rate [34].

An individual’s marital status was found to affect attendance rates with non-attenders more likely to be single [21,23,24,35,36,42]. Studies suggested a possible interaction between marital status and gender in explaining uptake. For example, a number of studies reported that attendance at health checks was higher in males who were married or cohabiting, compared to single males [21,24,35,42-44]. A possible explanation was proposed in a qualitative study using focus groups with participants and non-participants in community health screenings, which found that the decision to attend a screening is often made by the partner, with this initiation behaviour prevalent across a number of socio-demographic factors [45].
| Reference Number | Primary Author | Year | Title | Setting/Participants | Method | Key Findings |
|------------------|----------------|------|-------|----------------------|--------|--------------|
| 20               | Bletzer, K. V. | 1989 | Review of a health fair screening program in Mid-Michigan | America Health fair Open access 15124 participants | Programme evaluation Evaluation of sociodemographic data on attenders at health fairs over seven years and findings from a survey with a sample of participants | • Women consistently outnumbered men by a ratio of at least 3:2 every year  
• Older people were more likely to present than younger people, with half of participants older than 50  
• 90% of those surveyed had consulted their GP within the past two years  
• The number of serious problems identified was low  
• The main reason for attendance was “curiosity about health” |
| 21               | Culica, D.     | 2002 | Medical checkups: Who does not get them? | America Telephone survey |Telephone survey | • Reduced likelihood of having had health check in the previous 12 months was associated with being: 25-44 or over 65, male, unmarried, a smoker and in those who perceived cost barriers  
• Check ups were more likely in people who earned over $75,000, had health insurance, were physically active, had chronic disease and who rated their health as good, fair or poor rather than good or excellent |
| 22               | Greenland, P. | 2002 | Attendance patterns and characteristics of participants in public cholesterol screening | America Cholesterol screening Open access 10 supermarkets 8583 people were seen over 4 months | Programme evaluation of cholesterol screening programme Comparison of participant demographics with local census data | • Participants more likely to be white (98.3% v 96.7%), older, female (59.9% v 51.6%) and better educated than the general population  
• 22% had previous diagnosis of high cholesterol and came to confirm/monitor previous readings  
• 79% came to the store specifically for screening  
• Time was an important factor as weekend and weeknights attracted more men and younger people than weekday screenings  
• Less than 5% took time off work to participate |
Table 4 Summary of included studies (Continued)

| Study | Authors | Year | Setting | Type | Design | Population | Uptake | Findings |
|-------|---------|------|---------|------|---------|------------|--------|----------|
| 23    | Waller, D. | 1990 | UK | Programme evaluation | Attendance at General Practice health checks over | Medical record audit and postal questionnaire | 1458 patients (65.9%) were offered screening | Attendees were more likely to be women, aged 45yrs or older, married, non-smokers and of higher social class than the non-responders to the invitation |
|       |         |      |       |      |         |            |        | Relative likelihood for non-attendance was 1.24 for smokers, 1.20 for the overweight, 1.16 for heavy drinkers, 1.28 for those with a less healthy diet |
|       |         |      |       |      |         |            |        | Frequent GP consulters were more likely to attend |
|       |         |      |       |      |         |            |        | Men were invited opportunistically, women were invited in the context of cervical smear tests |
|       |         |      |       |      |         |            |        | 2211 men and women aged 35-64 were in the target age group |

| Study | Authors | Year | Setting | Type | Design | Population | Uptake | Findings |
|-------|---------|------|---------|------|---------|------------|--------|----------|
| 24    | Jacobsen, B. K. | 1992 | Norway | Quasi-experimental and survey | Health screening | Population screening and questionnaire | 82% attended the screening | 78% men and 86% women attended |
|       |         |      |       |      |         |            |        | Non-attenders tended to be single |
|       |         |      |       |      |         |            |        | 84% married men attended screening compared to 65% divorced/single or widowed men |
|       |         |      |       |      |         |            |        | 10497 patients aged 40-42 were invited |
|       |         |      |       |      |         |            |        | 88% married women attended compared to 79% divorced/single or widowed women |

| Study | Authors | Year | Setting | Type | Design | Population | Uptake | Findings |
|-------|---------|------|---------|------|---------|------------|--------|----------|
| 25    | Simpson, W. M. | 1997 | UK | 1. Quasi-experimental | Screening for risk factors for cardiovascular disease: A psychological perspective | Mobile screening programme and prospective questionnaire | Overall uptake 62.4%; 59% at further education college, 28% at council cleansing department, 81% at greetings card factory. | In general attenders were significantly older and more likely to be female than non-attenders |
|       |         |      |       |      |         |            |        | Attenders were more likely to have had a definite intention to attend, and were more aware of the availability of the service |
|       |         |      |       |      |         |            |        | 3 studies (only two were relevant to literature review) |
|       |         |      |       |      |         |            |        | 1. Worksite screening at three workplaces: |
|       |         |      |       |      |         |            |        | 2. Longitudinal |
|       |         |      |       |      |         |            |        | 1. Quasi-experimental |
|       |         |      |       |      |         |            |        | Mobile screening programme and prospective questionnaire |
|       |         |      |       |      |         |            |        | 2. Longitudinal Random allocation of invitation type |
|       |         |      |       |      |         |            |        | Further education college |
|       |         |      |       |      |         |            |        | Council Cleansing department |
|       |         |      |       |      |         |            |        | Two questionnaires: |
|       |         |      |       |      |         |            |        | 1. Worksite screening at three workplaces: |
|       |         |      |       |      |         |            |        | 2. Longitudinal Random allocation of invitation type |
|       |         |      |       |      |         |            |        | Greetings card factory |
|       |         |      |       |      |         |            |        | Open access |
|       |         |      |       |      |         |            |        | One week after screening to assess intention to change behaviour |
|       |         |      |       |      |         |            |        | The lower uptake at the council was attributed to the higher ratio of male to |
Table 4 Summary of included studies (Continued)

| Study | Design | Setting | Participants | Intervention | Results |
|-------|--------|---------|--------------|--------------|---------|
| 26 Thomas, K. J. 1993 | Case against targeting long term non-attenders in general practice for a health check. | UK | 30 General Practices | Mailed invitations | The median proportion of 3 year non-attenders was 23% in inner city practice compared to 9% in other practices. Non-attenders were more likely to be female. Female non-attenders were more likely to be older than male non-attenders. Non-attenders scored significantly better on six measures of perceived health status and used less accident and emergency services and preventive health care than attenders. |
| 27 Wall, M. 2004 | Non-participants in a preventive health examination for cardiovascular disease: characteristics, reasons for nonparticipation, and willingness to participate in the future | Sweden | Ockelbo project | Quasi-experimental Preventive health examination | 237 persons (76.7%) participated. Of 72 non-attenders at the health examination, 53 (73.6%) responded to the questionnaire, 14 (19.4%) agreed to a telephone interview and 5 (6.9%) did not respond. |
| Study Number | Author(s) | Year | Title | Country | Study Design | Key Findings |
|-------------|-----------|------|-------|----------|--------------|-------------|
| 28          | Cherrington, A. | 2007 | Do adults who believe in periodic health examinations receive more clinical preventive services? | America | Telephone survey | - Follow up telephone interview with non-participants who did not respond to questionnaire |
|             |           |      |       |          |              | - The proportion of smokers was significantly higher in non-attenders vs attenders at the health check (31.3% v 18.6%) |
|             |           |      |       |          |              | - Reasons for non-attendance included: lack of time or hindrances at work (52%), already in contact with health services (33%), or because they felt healthy (21%) |
|             |           |      |       |          |              | - However the majority of non-attenders (55%) said they would be interested in attending in the future, 28% said they were not sure, and 16% said they would not be interested |
| 29          | Karwalajtys, T. | 2005 | A randomized trial of mail vs. telephone invitation to a community-based cardiovascular health awareness program for older family practice patients | Canada | Prospective | - Non-endorsers of periodic health examinations received less preventive services |
|             |           |      |       |          |              | - 8.5% (n=374) did not endorse annual periodic health examinations |
|             |           |      |       |          |              | - Non-endorsers tended to be male (odd ratio (OR) 1.64), younger (OR 0.87), white (OR 2.91), to have at least some college education (OR 1.43) and feel healthy (1.85) |
|             |           |      |       |          |              | - 56% of non-endorsers had received a cholesterol check in the previous 5 years compared to 81% of endorsers |
| 30          | Hsu, H.Y. | 2001 | The relationships between health beliefs and utilization of free health examinations in older people living in a community setting in Taiwan | Taiwan | Cross-sectional survey | - Higher uptake of health examination in those with higher education and socio-economic status, and those with increased family support (6% of users lived alone compared to 13% of non-users) |
|             |           |      |       |          |              | - Users perceived a higher level of seriousness and susceptibility to ill health than non-users |
| 31          | Bowden, R.G. | 2001 | Comparisons of cholesterol screening participants and non-participants | America | Stratified random systematic sample | - Participants were more likely to be male (68.5% v 60.7%) |

Table 4 Summary of included studies (Continued)
| Study (Reference) | Year | Title | Study Design | Population Details | Data Collection | Sample Size | Key Findings |
|------------------|------|-------|--------------|--------------------|----------------|-------------|--------------|
| 32 Franks, P. 1991 | Barriers to Cholesterol Testing in a Rural-Community America | Cross-sectional population based survey | 270 participants, 587 random sample of nonparticipants | Worksite screening University Invite with pay check | 55.7%, older (47.0 years v 40.4 years), white (91.9% v 78.7%), have a college degree (85.9% v 51.3%) and have higher mean salaries than nonparticipants ($50,054 v $30,009) | | - Barriers to uptake in non-attenders were suggested to be cost, less flexible working hours, lack of access to communication methods including email, conspiracy theories around the employer's motives and that the workers did not feel sick and did not need screened |
| 33 Jones, A. 1993 | Comparison of risk factors for coronary heart disease among attenders and nonattenders at a screening programme Wales | Case control | 3800 patients invited for health check, 2402 (63.2%) attended Aged 25-55 years | General Practice Mailed open invitation then fixed appointment mailed, telephone call and home visit for nonresponders | Survey of 1063 people 973 (92%) screened for cholesterol | 98 non-attenders eventually presented for a health check and their results were compared to initial attenders | - Non-attenders were more likely to be older, have higher body mass index, cholesterol and blood pressure, and low socio-economic status, a personal/family history of heart disease, be smokers, have low educational level and high alcohol consumption than attenders |
| 34 Sonne-Holm, S. 1989 | Influence of fatness, intelligence, education and sociodemographic factors on response rate in a health survey Denmark | Case control | 362,200 male draftees to Danish military board Mailed invitation and reminder | Health examination Survey of cohort of severely obese men with a randomly selected control group invited to a health examination | 1651 identified as severely obese draftees 1504 controls were randomly selected from the remaining population | Survey of 1398 non-attenders identified 140 individuals who were repeatedly contacted and encouraged to attend a health check. | - Reasons given for not attending the initial screening programme were varied with 36.7% claiming not to have received the letter and 26.5% citing practical barriers |

Table 4 Summary of included studies (Continued)
| Study | Authors | Year | Design | Setting | Participants | Methods | Key Findings |
|-------|---------|------|--------|---------|-------------|---------|--------------|
| 35    | Walker, M. | 1987 | Non-participation and mortality in a prospective study of cardiovascular disease | UK | British Regional Heart Study | Prospective study of cardiovascular disease in middle aged men | 7735 men (74.3%) participated in the study. Non-participants had a significantly higher relative risk of death during the first three years after the screening date. Non-participants were more likely to be younger, unmarried and less skilled workers than participants. |
| 36    | Thorogood, M. | 1993 | Factors affecting response to an invitation to attend for a health check | UK | Quasi-experimental | Postal questionnaire before invite to attend a health check and subsequent record of attendance | 2205 attended (82.3%). Non-attendance was higher in males than females (21% v 15%). Non-attenders were more likely to be single than married (24% v 16%), manual rather non-manual workers (21% v 15%), living in rented accommodation rather than homeowners (29% v 16%) and not have access to a car rather than be a car user (27% v 16%). Non-attenders were less healthy than attenders as shown by following odd ratios: 1.74 smokers, 1.07 heavy drinkers, 1.91 less healthy diet, 1.50 for obese patients. Attenders were more likely to visit their GP frequently and indicate a willingness to change their behaviour. |
| 37    | Dignan, M. B. | 1995 | Factors associated with participation in a preventive cardiology service by patients with coronary heart disease | America | Prospective cohort/ Qualitative | Cardiology clinic Face to face open invitation and follow up letter | 24 patients (39%) attended the clinic. No statistically significant demographic differences were found between attenders and non-attenders. Patients who attributed their hospitalisation to a heart attack or coronary bypass surgery were more likely to attend the clinic than those who attributed admission to chest pain or for diagnostic reasons. |
| 38    | Griffiths, C. | 1994 | Registration health checks: Inverse care in the inner city? | UK | Survey | Questionnaire analysis | 356 patients: 101 declined/provided inadequate data. Non-attenders were significantly more likely to be unemployed, African, heavy smokers and of lower social class than attenders. Demonstrated that invitations to health checks given in an unselected way are least likely to engage with those in most need. |
Table 4 Summary of included studies (Continued)

| Study ID | Author | Year | Title | Country | Methods | Findings |
|----------|--------|------|-------|---------|---------|----------|
| 39       | Wilson, S. | 1997 | Health beliefs of blue collar workers: increasing self efficacy and removing barriers | USA | Cross-sectional, descriptive, ex-post facto questionnaire | Of the remaining 256 patients, 118 attended a health check (46%) • 151 (75.5%) completed questionnaires • 45 workers (22.5%) subsequently attended a health check • No significant difference between respondents and participants by age, race, education, gender, marital status, shift or health history • Workers who participated in the screening had significantly higher self-efficacy and perceived significantly fewer barriers to participation than non-attenders |
| 40       | Boshuizen, H. C. | 2006 | Non-response in a survey of cardiovascular risk factors in the Dutch population: Determinants and resulting biases | Netherlands | Logistic regression of determinants of participation in a health examination survey in previous participants in a health interview study | Of the remaining 256 patients, 118 attended a health check (46%) • 151 (75.5%) completed questionnaires • 45 workers (22.5%) subsequently attended a health check • No significant difference between respondents and participants by age, race, education, gender, marital status, shift or health history • Workers who participated in the screening had significantly higher self-efficacy and perceived significantly fewer barriers to participation than non-attenders |
| 41       | Pill, R. | 1985 | Invitation to attend a health check in a general practice setting: comparison of attenders and non-attenders | UK | Quasi-experimental | • Attenders were generally better educated, of higher social status, had greater health motivation, fewer ties and commitments, attended church more regularly, employed, performed more health approved practices, had had more recent contact with GP, and accepted the legitimacy of the doctor’s interest in their lifestyle than nonattenders • Attenders were more likely to have no children under 5, no dependents and have fewer than 6 |
| Study | Authors | Year | Description | Methods | Findings |
|-------|---------|------|-------------|---------|----------|
| 42    | Persson, L. G. | 1994 | A Study of Men Aged 33-42 in Habo, Sweden with Special Reference to Cardiovascular Risk-Factors | Quasi-experimental study | Follow up of non-attenders by mailed questionnaire and telephone |
|       |         |      |             |         |          |
|       |         |      |             |         | 652 men (86.1%) had attended after one mail invitation |
|       |         |      |             |         | 16 of 105 non-participants, 16 were known high consumers of health care, 40 had recently had a health examination (mostly at work) and 49 were not interested in a health check |
|       |         |      |             |         | Non-attenders were more likely to be single, smokers, on the sick list, on a lower income or more often unemployed than attenders |
| 43    | Christensen, B. | 1995 | Characteristics of attenders and non-attenders at health examinations for ischaemic heart disease in general practice | Quasi-experimental study | Multi-practice study and questionnaires to assess the influence of a fee to attend a health examination |
|       |         |      |             |         | Attendance was higher in free health examinations than those which charged a fee (66% v 37%) |
|       |         |      |             |         | Attendance was significantly lower in single men than cohabitants |
|       |         |      |             |         | Whether the service was free or not was the biggest predictor of attendance as health beliefs of attenders and non-attenders were similar |
| 44    | Difford, F. | 1987 | Continuous opportunistic and systematic screening for hypertension with computer help: Analysis of nonresponders | Programme evaluation | Audit of medical records |
|       |         |      |             |         | Analysis of characteristics of 192 nonresponders |
|       |         |      |             |         | 2354 patients (92%) had blood pressure recorded in the previous 5 years after 2 years |
|       |         |      |             |         | Those who had been screened have higher consultation rates (6x greater) than non-responders |
|       |         |      |             |         | There was no difference by distance to the practice or number of years registered with the practice |
|       |         |      |             |         | The only significant difference was that nonresponders were the only people in a household registered with a practice which was interpreted that they were either single or had a lack of need to identify with the “family” doctor |
| 45    | Engebretson, J. | 2005 | Participation in Community Health Screenings: A Qualitative Evaluation | Qualitative Focus groups | Described domains of motivation for presentation:
Table 4 Summary of included studies (Continued)

| Participants in screenings at 5 settings: | 5 with attenders | • Self-care orientations (e.g. self-assessment/no perceived need) |
|------------------------------------------|-----------------|---------------------------------------------------------------|
| University employees                     | 1 with nonattenders | • Interpersonal influences (e.g. endorsement by others/fear of embarrassment) |
| County fair attendees                    |                  | • Accessibility (e.g. convenience/lack of time) |
| Senior citizen centre clientele          |                  | • Overlap of facilitators and barriers to participation; what motivated one participant to attend may act as a barrier to another |
| Local industry employees                 |                  |                                                               |
| University student                       |                  |                                                               |
| Group of non-attenders                   |                  |                                                               |

46  Harpole, L.H.  2000  Feasibility of a tailored intervention to improve preventive care use in women

America  Survey mailed to 893 women aged 50-55  Survey to identify outstanding preventive health care needs

47  Norman, P.  1991  Predicting attendance at health screening: Organizational factors and patients’ health beliefs

UK  General Practice  Programme evaluation

Health check  A health belief questionnaire was sent to sample of 221 patients who were subsequently invited for screening

Health belief questionnaire  11 patients were interviewed directly after their screening appointment

325 patients aged between 30 and 50  131 (59.3%) questionnaires were returned. From this group 98 attended and 33 did not attend the subsequent health check

325 patients aged between 30 and 50  • The two invite methods had similar attendance rates but the letter invite was more efficient, as opportunistic screening relied on patients presenting at their GP before they could be invited

11 patients were interviewed directly after their screening appointment  • Opportunistic screening was slightly biased in favour of females

• Attenders were more likely to report cutting back on daily activities when ill and believe in the seriousness of high blood pressure and weight problems

• Non-attenders were found to be more worried about the screening appointment and perceived more barriers to attendance
### Table 4 Summary of included studies (Continued)

| Study | Year | Title | Design/Method | Findings |
|-------|------|-------|---------------|----------|
| 48    | 1997 | Shiloh, S. | A convenience sample of 252 asymptomatic individuals were invited to participate in one of four screening programmes: dental check up, blood pressure measurement and cholesterol testing, pap smear or mammography. | Quasi-experimental Analysis of participants in a screening programme Questionnaire tailored to specific screening programme and whether individual attended or did not attend |
|       |      |        |               | • 137 (54%) attended and 115 (46%) did not attend • Motivations and health beliefs varied by screening programme • Non-attenders were more likely to justify their nonattendance behaviour with danger control motivations than fear control ones • 61% non-attenders did not believe in the efficacy of screening in reducing their illness threat whereas 39% were too afraid of the possible results to attend |
| 49    | 1993 | Norman, P. | The role of social cognition models in predicting attendance at health checks UK General Practice Mailed invitation with fixed appointment time or open invitation Health belief questionnaires sent before patients received invite letters | Prospective survey/programme evaluation |
|       |      |        |               | • 419 patients were sent open invitations • 399 patients were sent fixed appointments • 433/818 patients attended a health check; 69.7% of those sent fixed appointments and 37.1% sent open invitations attended • Questionnaire data showed that for those that were sent a fixed appointment, attenders were more likely to place a high value on health, to believe health is influenced by powerful others, to be advised by referent groups to attend, to believe in the positive outcomes of screening and to not be affected by motivational barriers than nonattenders • For those sent an open invitation, intention to attend and perceived control were independent predictors of attendance behaviour |
| 50    | 1991 | Norman, P. | Of the 168 invited by letter, 121 patients (72%) attended a health check | Programme evaluation |
|       |      |        |               | • Only 83/157 patients had been invited opportunistically, but attendance in those that had been invited was 74.7% • The remaining patients who had not yet been invited opportunistically were sent a fixed appointment which produced 55.4% attendance |
Table 4 Summary of included studies *(Continued)*

| Study | Design | Participants | Methods | Findings |
|-------|--------|--------------|---------|----------|
| 51    | Nielsen, K.D.B. 2004 | “You can't prevent everything anyway”: A qualitative study of beliefs and attitudes about refusing health screening in general practice | Denmark | Letter with fixed appointment (n=168) or notes were tagged so patient was invited opportunistically to make an appointment for a health check when they presented at the practice for another reason (n=157) Questionnaire was issued after health check to assess views of health check 11 patients were interviewed | • 159/224 patients returned their questionnaires • Those invited opportunistically were most likely to report that keeping their appointment time was easy, and were least likely to change it. • Those given fixed appointments experienced more difficulty in attending even if they were well motivated |
| 52    | Norman, P. 1989 | Intention to attend a health screening appointment: Some implications for general practice | UK | Questionnaire to assess predictors of intention to attend a health check | • Reasons for non-attendance: too busy, healthy, recent contact with general practice, don't want to know if ill, no symptoms, major life events, actual health problems • They stressed the importance of autonomy, and that they would go to see their doctor when they needed to |

| 479 patients aged 25-50 | Sent questionnaire | | |
| Study ID | Authors | Year | Country | Title | Design | Participants | Methodology | Findings |
|---------|---------|------|---------|-------|--------|--------------|-------------|---------|
| 53      | Williams, A | 2001 | USA | Cultural sensitivity and day care workers: examination of a worksite based cardiovascular disease prevention project | Programme evaluation of screening initiative over three years | | Strategy to recruit child day care workers in a cardiovascular disease screening and risk reduction programme | Participation rates were increased from 26% to 73% over the duration of the project by adapting recruitment strategies to the target group’s cultural values and lifestyles, and building trust. 70% of participants cited convenience (because it was offered at their workplace) and the fact that it was free as motivators to attend. A lack of knowledge of cardiovascular risk was identified in this population as just over 10% of participants were aware of their blood pressure or blood cholesterol. Non-participants had been tested recently or were not interested in the screening at the time it was offered. |
| 54      | Ornstein, S. M | 1993 | USA | Barriers to adherence to preventive services reminder letters: the patient’s perspective | Qualitative Telephone survey (n=307) | Reminder letters sent to 1077 patients | Focus groups of non-responders to a reminder letter (n=27) | 307 patients were surveyed by telephone to assess reasons for non-response to a letter for screening. 154 (50.2%) did not recall receiving the letter, 84 (27.4%) recalled receiving the letter but not its content, 69 (22.5%) recalled both. Highlighted the importance of the format and content of reminder letters to improve uptake of cholesterol checks by making them distinguishable from a bill, conveying a personalised message and addressing logistical barriers. |
| 55      | Pill, R. | 1988 | UK | Invitation to attend a health check in a general practice setting: the views of a cohort of nonattenders | Qualitative Interview of nonattenders | 259 men and women aged 20-45 who did not respond to a mailed invitation for a health check at General Practice | | 236 (91%) recalled getting the invitation, 3% could not remember and 6% denied ever receiving the invitation. Reasons for non-attendance: 44% were not interested, 24% forgot to attend, 26% cited crises at home or work, 11% felt screening was inappropriate. |
| 56      | Thompson, N. F. | 1990 | UK | Inviting infrequent attenders to attend for a health check costs and benefits | Quasi-experimental Audit of sample of practice records (n=1488) to | General Practice | | 17/94 patients (18%) attended. Of the remaining 77 patients, 3 had moved. |
| Study | Authors | Year | Title | Design | Details |
|-------|---------|------|-------|--------|---------|
| 57 | Hegarty, V. | 1995 | Reasons for nonresponse among older adults | UK General practice | Mailed fixed appointment to 94 patients who had not attended general practice within the previous 3 years. 1342 invited for a health check, 847 attended. Reasons for nonresponse were assessed with a questionnaire. |
| | | | | | Of those who cancelled, 8 were working or studying away from home, 4 found the appointment time unsuitable but did not wish to rearrange and 16 did not need or want an appointment. Those presenting were in general healthy with low levels of smoking and alcohol consumption and mild hypertension only diagnosed in one patient. |
| 58 | Levine, J. A. | 1991 | Are patients in favour of general health screening? | UK General Practice | Cross-sectional survey of 375 consecutive patients. 198 individuals who had not attended general practice for 12 months. 315/375 (84%) attenders completed the questionnaire. 93/198 (47%) non-attenders completed the questionnaire. A significantly greater proportion of attenders (83%) indicated they would make an appointment and attend for health screening compared to nonattenders (66%). 33% of attenders would seek health screening even if not contacted by their doctor v 16% of nonattenders. |
The tendency of women to present more than men (as evidenced earlier) persists regardless of marital status. Higher rates of attendance in women who were single, divorced or widowed (79%) were found compared to men with equivalent marital status (65%). Furthermore, the rates of attendance were 88% in married women and 84% in married men, indicating that being married appears to have a stronger effect on uptake in men [24]. Other studies have found no relationship between marital status and attendance rates [39,41,46].

In general, white individuals were more likely to engage with preventive health services than individuals from other ethnic backgrounds [22,31,38,40,46]. However, ethnicity was only reported in a small proportion of the studies (Seven of 39 papers). Only one of these reported no difference according to race [39]. One paper reported a higher proportion of non-attenders at registration health checks were of African origin [38]. On the other hand, a large American survey (n = 4879) found that 9.6% of white people did not believe in periodic health examinations compared to 3.4% of black people, and that black people were more likely to have been screened for cholesterol in the past 5 years than white people [28].

What are patients' reasons for not attending preventative health checks?

The relationship between social cognitive factors and attendance behaviour was not straightforward as although health beliefs were found to affect uptake [47], the factors influencing the decisions of attenders and non-attenders may not necessarily reflect "opposite motivations of beliefs" [48]. To clarify, this meant that attenders may present for screening to reduce the fear or perceived danger of a condition, while non-attenders may have used the same rationale to not present, e.g. they did not feel at risk or were too frightened of the possible outcome if they did attend.

Despite this caveat, non-attenders were shown to value health less strongly, have lower self-efficacy, feel less in control of their health and be less likely to believe in the efficacy of screening [39,49]. Components of the health belief model were identified as significant predictors, with those who did not engage with services less likely to feel susceptible to ill health or perceive the conditions being screened for as serious as those who attended [25,30,48].

Individuals may present in response to symptoms, a family history of the condition [29], or to seek reassurance [50]. Others are simply interested in their health, seek confirmation of a previous reading/monitor an existing condition or are worried well [20,22,45]. Those who do not present may have no perceived need for a health check: they may feel healthy or have an absence of symptoms [27,33,51,52], are already in contact with the health service [27,33,41,51,53], or have recently had a health check [27,51,54]. Alternatively, they are aware they are unhealthy and do not want to be told off and have to make lifestyle changes, or have a fear of what it might find [26,28,31,47,51].

Fear acted as a barrier to uptake of screening in a number of ways, including: a fear of what the health check might find [33,52,55], the belief that "what I don't know won't hurt me" [45] and that knowing wouldn't make them any happier [51], or the fear of the test results [25,45] and their consequences [51]. Concerns related to the procedure itself were also apparent in relation to a fear of needles or a general fear of doctors or medical settings, anxiety about what the tests might involve [45,47] or the experience level of those carrying out the tests [45].

What are the clinical needs and risk factors of those who present for health checks?

Non-attenders had a greater proportion of cardiovascular risk factors than attenders. Smokers were less likely to attend than non-smokers [21,23,25,27,32,33,36,38,42,46,56]. Unhealthy lifestyle factors were important predictors of non-attendance, with odds ratios higher for smokers, heavy drinkers, and those with unhealthy diets and the obese [36]. However, one paper showed occasional smokers and ex-smokers were more likely to receive a check-up than non-smokers [21] and smokers with the intention of giving up were more likely to attend than those who did not want to [23].

A personal history but not family history of coronary heart disease (CHD) was significantly more common in non-attenders, as was a higher body mass index (BMI) [34], high cholesterol, systolic and diastolic blood pressure values [33].

Follow up of non-participants in a prospective study of cardiovascular disease found that this group were more likely to have died than participants in the three years following the health checks. The difference in the mortality rates between participants and non-participants was biggest in the youngest age group (40–44 year olds), indicating premature death. However, the mortality rates were not significantly different between these groups for cardiovascular disease or cancer [35].

The vast majority of studies supported the higher risk profile of non-attenders; however, non-attenders were found to have lower levels of cholesterol than those who did attend in a post-study follow up [32]. In another study initial responders had higher total cholesterol but lower diastolic blood pressure than those who had to be re-contacted [24].

In general, frequent or recent consulters at General Practice were found to be more likely to present for a health check [23,32,36,40,41,44] but for some people this
recent or on-going contact can be a reason not to attend [27,42,51,57]. Consequently, this inconsistent relationship between frequency of attendance at GP practice and the likelihood of participation in preventive health screening has been described as 'complex' [40], and the two areas are inherently related. Some studies have shown that frequent or recent GP consulters are more likely to attend for a health check [23,32,36,40,41,44]; for example, over 90% of patients who attended a health check at a shopping centre reported having a regular source of medical care [22]. Conversely, other patients cited recent or ongoing contact with their GP as reasons for not attending a health check [27,42,51,57]. A survey of attenders and non-attenders at General Practice in the past year showed that attenders were more likely to indicate that they would make an appointment for a health check compared to non-attenders (83% v 66%) [58].

Discussion

This review identified a substantial number of primary empirical studies contributing data to questions of uptake. Although the heterogeneous nature of interventions and populations precluded formal statistical meta-analysis, there appeared sufficient commonality across studies to inform a number of key conclusions. Routine health check-ups appear to be taken up inequitably with gender, age, socio-demographic status and ethnicity all associated with differential service use. Furthermore, non-attenders appeared to have greater clinical need or risk factors suggesting that differential uptake may lead to sub-optimal health gain and contribute to inequalities via the inverse care law. Our findings provide an initial contribution to the development of programme theories or conceptual frameworks to underpin future strategies, as suggested by NICE and others [59,60].

Limitations of the review

Established and appropriate search strings were not available thus necessitating the development of new strategies. Like all reviews we cannot guarantee that studies have not been missed. However, our emphasis was on sensitivity over specificity resulting in almost 18,000 papers being examined by members of the team. We therefore believe that it is likely that few papers were missed. The purpose of the review was to identify sufficient studies across diverse contexts to inform the theoretical and practical development of future interventions to improve uptake of health checks. This necessary focus on diversity also meant that formal statistical meta-analysis or meta-regression of predictors of uptake would have been inappropriate.

The majority of studies came from North America (n = 13) and Europe (n = 24), and the remaining two papers were from Israel and Taiwan. There may have been benefits from loosening inclusion criteria to include both geriatric health checks and non-developed countries. Such diversity could potentially lead to sufficient numbers of papers with common interventions or populations as to justify a number of meta-analyses of effectiveness or meta-regression of predictors of uptake. While the scoping nature of this study precluded such an approach for pragmatic reasons we have demonstrated that such a review may be feasible and desirable in the future.

The inverse care law in operation

In his original description of the inverse care law Julian Tudor Hart's argued that "the availability of good medical care tends to vary inversely with the need for the population served" [14]. The validity of his law was demonstrated in a number of studies and in a number of ways in our review. Men from lower socio-economic backgrounds and on low incomes were consistently found to be less likely to engage with check-ups than women or people from a higher socio-economic status. Both of these variables are well established risk factors for a range of clinical conditions, perhaps most importantly in the context of this study, cardiovascular disease. This, again, was reinforced through this review since non-attenders were consistently found to have a range of poor lifestyle behaviours including smoking, alcohol consumption and diet. These findings suggest that without adaptation or increased efforts to increase uptake from these more "needy" populations there is the possibility that health checks, like other contemporary public health policies, risk exacerbating rather than narrowing health inequalities [61].

Implications for future service design

Given the diversity of populations, clinical needs and motives not to attend health checks, a “one size fits all” solution consisting of promoting attendance at health checks and subsequent support for behaviour change is simplistic and flawed, particularly in the interaction with patients with complex needs [62]. Indeed, the current focus on a limited number of delivery types, and a failure to tailor services may at least in part contribute to the problem. However, while it would appear sensible to assume that complex problems require complex solutions, there may be exceptions. The increasing role of both social marketing and financial incentives as drivers of behaviour change both focus on increasing perceived value while not essentially changing the service itself or addressing many of the pre-stated barriers. Incentive based schemes are gaining significant attention as a means of promoting behaviour change through extrinsic motivations [63-65]. However, such schemes have led to a number of questions with regard to political acceptability, ethical justification and effectiveness. In addition,
questions over their ability to sustain behaviour modification, once an incentive is withdrawn, were raised [64]. Given the preponderance of people on lower incomes among non-attenders, incentive schemes, whether based on finance or benefits in kind, may prove particularly effective and could be considered.

If tailoring of health check-ups is to take place then consideration would need to be given to the varied demands that this would place on health professionals charged with delivering the service. Among the challenges surrounding service delivery are clinician’s frequently low adherence to protocols on prevention within consultations [66-68]. This may be related to a lack of awareness of, and agreement with, guidelines, or a belief that many practices and outcomes would be difficult to change due to time pressure and other issues [69,70].

Moreover, clinicians in deprived communities are faced with higher rates of ill health and multi-morbidities, poor patient access, and high stress levels among clinicians, which in turn lead to higher demands on the service and service provider [71]. Diversifying the provision of health checks to multiple tailored forms may well exacerbate these pressures and reduce service compliance to such new protocols unless tailoring is largely cost and time neutral. Certainly, increasing intervention complexity may be associated with reduced levels of implementation. An alternative approach may be to provide increased emphasis on opportunistic health checks at routine consultations; although even this has still been found to be time consuming [8]. However, it has recently been suggested from a substantive evaluation of a complex outreach prevention service that the complexity of reasons for non-engagement among some people may not be predictable or “read in advance” [59]; this would suggest that whatever tailoring to services is made there will always be an imperative on the skill of the clinician to judge and respond to unique opportunities within the opportunistic consultation as well as wider systems approaches [59].

Conclusion
All of these challenges and complexities indicate that a diverse range of approaches may be required if the full benefit of health checks are to be realised. While tailoring and targeting the form of delivery may have a role to play, it is likely that their implementation would require increased investment to ensure adoption and sustainability, particularly if narrowing health inequalities is a serious and central goal of such health checks. The Marmot report “Fairer Society Fairer Lives”, recently argued for a policy of “proportionate universalism”:

“Focusing solely on the most disadvantaged will not reduce health inequalities sufficiently. To reduce the steepness of the social gradient in health, actions must be universal, but with a scale and intensity that is proportionate to the level of disadvantage. We call this proportionate universalism.” p15 [72].

Such proportionate universalism would define “tailoring” as much in terms of the scale and intensity of action required for those most in need, as much as any changes in objective intervention form. Whatever approach is adopted, it is important that a clear theoretical underpinning that acknowledges both the complexity of the diverse population needs/attitudes and the challenges currently facing primary care and associated public health services is required. This synthesis of current findings has attempted to make a contribution to such a development.

Competing interests
The authors declare that they have no competing interests.

Authors’ contributions
RD designed the study, conducted the review and contributed to the writing of the paper. BW was involved in the design of the study and wrote the paper. CMC contributed to the review and the paper. MTH contributed to the review and the paper. All authors read and approved the final manuscript.

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