Nudging in Screening: Literature Review and Ethical Guidance

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Key words: Nudging, ethics, information, choice, paternalism
Abstract word count: 249
Word count text: 2879
Number of references: 40 (for print) and 79 (for supplement)

Acknowledgement

We are most thankful to Hilde Faatten for excellent help with the literature search (described in Supplement 1).

Conflict of interests: We have no conflict of interests to declare.

Contributions: BH drafted the outline of the study, initiated the literature search and made the first draft of the manuscript. MS revised the outline of the study, reviewed the included literature, and contributed to every revision of the manuscript. Both authors approve of the submitted manuscript.

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Abstract

Objectives: Nudging is the purposeful alteration of choices presented to people that aims to make them choose in predicted ways. While nudging has been used to assure high uptake and good outcome of screening programs, it has been criticized for being paternalistic, undermining free choice, and shared decision making. Accordingly, the objective of this study is to explore a) nudging strategies identified in screening, b) arguments for nudging; and on basis of this, to c) suggest a tentative conclusion on how to handle nudging in screening.

Methods: Literature searches in Ovid MEDLINE and PsycINFO for combinations of screening and nudging. Screening based on content analysis of titles, abstracts, and articles.

Results: 239 references were identified and 109 were included. Several forms of nudging were identified: framed information, default bias, or authority bias. Uptake and public health outcome were the most important goals. Arguments for nudging were bounded rationality, unavoidability, and beneficence, while lack of transparency, crowding out of intrinsic values, and paternalism were arguments against it. The analysis indicates that nudging can be acceptable for screenings with (high quality) evidence for high benefit-harm ratio (beneficence), where nudging does not infringe other ethical principles, such as justice and non-maleficence. In particular, nudging should not only focus on attendance rates, but also on making people "better choosers."

Practice implications: Four specific recommendations follow from the review and the analysis: 1) Nudging should be addressed in an explicit and transparent manner. 2) The means of nudging have to be in proportion to the benefit-harm ratio. 3) Disagreement on the evidence for either benefits or harms warrants special care. 4) Assessing and assuring the intended outcome of nudging appears to be crucial, as it can be context dependent.

Highlights

- Nudging is prevalent in screening programs
- Nudging is highly criticized for being paternalistic
- Nudging cannot be avoided
- Therefore it is important to provide ethical guidance on nudging
- Four specific recommendations for nudging in screening are provided and explained

Nudging in Screening: Literature Review and Ethical Guidance

1. Introduction:

The purpose of screening is to improve individual as well as population health. Screening aims to detect and treat diseases in their early stages in order to reduce morbidity and increase survival. Screening is thus introduced in most health care systems for a wide range of conditions. One example of a screening program which is considered to be of great benefit is newborn screening, as the detection of Phenylketonuria (PKU) and subsequent treatment make a tremendous difference to the affected child's life.

With this goal in mind, screening providers have aimed to increase the uptake of screening programs to assure good outcomes. Building upon the knowledge from behavioral sciences that the way choices are presented has an impact on the outcome of choice, providers have become intentional about how they design the choices to the potential screening subjects [1-10]. Screening providers have thus nudged people to participate [11, 12]. Deciding on content and wording in information leaflets and invitation letters as well as making choices on providing screening as opt in or opt out may be examples of such intentional work.

Nudging is a tool of public policy decision-makers that has recently gained a lot of popularity in governments across many high-income countries like Denmark, Australia, or the UK, to name a few [13]. It presents an alternative to restrictions and incentives as it aims to influence the choice subtly, without the use of regulation. It aims to guide people in making decisions and encourage them to choose in their broad self-interest. For that reason, such intentional alteration of choices presented to people that aims to make them choose in the predicted way stirred a debate about paternalism and manipulation.

The theory of nudging operates on two assumptions. Firstly, people exhibit bounded rationality. When making decisions, rather than being rational economic optimizers, they follow their mental shortcuts and cognitive biases [13, 14]. They do not always make what rational decision theory would call the "optimal" decision, rationally weighing the options at hand and deciding for the best one, but follow other principles such as common sense, rule of thumb, or educated guess. Furthermore, their attitude to risk-taking, their current emotional states, or the time available to make a decision also influence their decisions. Secondly, institutions inevitably act in ways that influence peoples' choices and so the choice design in place pushes people one way or the other regardless of whether the institutions are intentional about it or not [15]. Becoming intentional about it, however, means that institutions need to take a stance on what is good for a given individual and nudge him or her in that direction. That however, constitutes paternalism. In daily life, default setting on a computer are a nudge, so is a text message reminding a patient of a scheduled doctor's appointment, or the graphic warnings on cigarette packages [13].

Despite great benefits of many screening programs, some screening programs have attracted vast debates and vivid controversies. There are many reasons for this. First, screening programs are directed at healthy persons, and to improve the health of healthy persons may be more difficult than to improve the health of persons with manifested disease. Second, there has been increased attention on the negative consequences of screening programs as detecting diseases too early can lead to overdiagnosis and overtreatment. Thirdly, there have been controversies about the outcomes of screening programs, i.e., how many persons are saved from disease and death. These debates have been particularly heated for thyroid [16], prostate [17], and breast cancer screenings [18]. Such controversies raise the question of how screening programs should handle nudging. High uptake is important for good public health outcomes. At the same time, people's right to make autonomous and free choices has gained increased attention.

After having received criticism for being biased, not supporting shared decision-making, and not being clear about information on outcomes passed onto the participants [1-10, 19], many screening programs have adjusted the way they present the choice to their invitees. Nonetheless, there is still a debate on whether people are unduly nudged to ensure attendance.
Accordingly, **the objective** of this article is to explore a) nudging strategies identified in screening, b) arguments for nudging; and on basis of this, to c) suggest a tentative conclusion on how to handle nudging in screening. Nudging influences educational, counseling, and communication models in health care, and the awareness and handling of nudging is of great importance for patient education and counselling.

2. Methods:

Material: Literature searches have been performed in Ovid MEDLINE (1946 – October 2017) and PsycINFO (1908 – October 2017) for screening and nudging. The search terms were as follows:
Database: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) <1946 to Present> Search Strategy:
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1 exp Mass Screening/ (120594)
2 screening.tw,kf. (462083)
3 1 or 2 (505078)
4 (nudg* or libertarian paternalism).tw,kf. (759)
5 persuasive communication/ or (persuasion or persuasive).tw,kf. (6536)
6 (decision making/ or choice behavior/) and informed consent/ and ethics.fs. (1152)
7 4 or 5 or 6 (8345)
8 3 and 7 (228)

Database: PsycINFO <1806 to October Week 2 2017> Search Strategy:
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1 (screening and nudg*).mp. (5)
2 (screening and paternalism).mp. (13)
3 1 or 2 (16)
4 limit 3 to "0100 journal" (11)

Method: Identified references were screened for title and abstracts. References were included to full text analysis based on content relevance. Articles that addressed the following questions (in one way or the other) were included:

1. What nudging strategies are identified in which type of screening?
2. What arguments are used with respect to nudging and what are their backgrounds?

As important aspects and good arguments can appear in poor quality publications and vice versa, no quality limitations were set for publications beyond being peer reviewed indexed publications. Moreover, as the point is to identify important aspects of nudging in screening (content) and not extension (i.e., counting how many times certain aspects are mentioned or discussed), the review does not aim at being exhaustive. Unless references add new aspects or nuances, they are not included. Hence, the review does not pretend to be exhaustive.
Articles were analyzed according to standard content analysis [20] to address the above questions. Primary screening was conducted by BH and checked by MS.

3. Results:

239 references were identified. 75 references were included after removing duplicates and after irrelevant articles were assessed by title. Of the 75 references, 59 were included based on assessing

abstracts. 56 of these were included based on the content of the articles. Additionally, 53 references were added by a snowballing technique.
The topics identified in the literature that concern the empirical practice of nudging in screening are structured under: forms of screening, types of nudging, and aims of nudging. The topics that concern the theoretical discussion about nudging in screening are presented as arguments for or against nudging, as well as who does the nudging. An overview of the search results are given in Figure 1 and an overview of the other results is presented in Table 1.

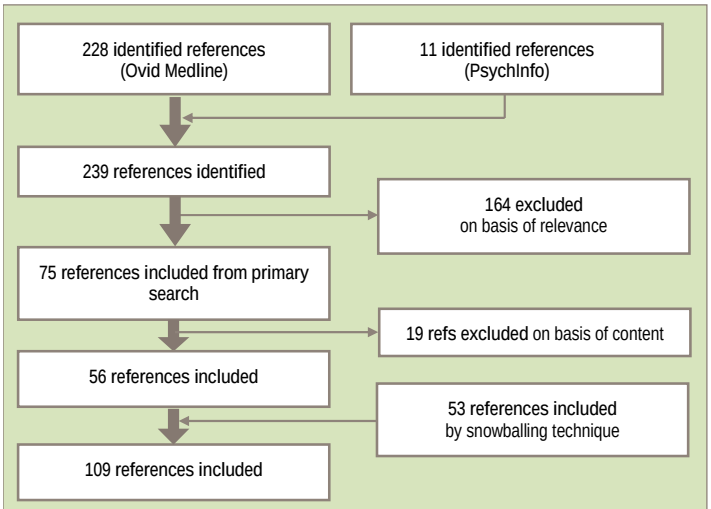

Figure 1 Results from literature search

3.1 What nudging strategies are identified in the literature?

Types of screening where nudging is discussed:
Nudging is discussed in a wide range of areas, such as prenatal screening [21-27], newborn screening [28, 29], and adult screening. Nudging is also debated in areas such as screening for abdominal aorta aneurisms [14], obesity [30-33], diabetes [34, 35], chronic beryllium disease [36], and HIV [21, 37-39]. However, the majority of references are to various types of cancer screening [40-58], predominantly breast cancer screening [2, 59-75].

Aim of nudging
The aim of nudging is mainly to ensure high uptake and attendance [76], but nudging has also been discussed in the context of scientists framing research results for health decision-makers in order to promote screening (second order nudging) [14].

Forms of nudging in screening:
Several forms of nudging are identified in the literature. Framing information is the most predominant form discussed as nudging [2, 62, 65, 69, 70, 75, 77-85]. Another form of nudging is working with the default bias, e.g., predetermined appointments [49, 86, 87], as well as screening kits sent by mail (reduction of the "hassle factor/friction cost") [49]. Personalized letters, educational phone calls and videos [42], as well as telephone reminders (availability heuristics) [49], persuasion [88], and GP's signature (authority bias) [49] are also discussed. Minor monetary incentives [89], appeals to fear, and the use of threats have also been discussed [90]. Moreover, the mere offering of a screening program is interpreted as a recommendation by the public and may also be viewed as nudging [45, 65]. In this context, appealing to people's sense of responsibility, solidarity, and duty have been pointed out to be mechanisms by which to increase attendance.

3.2 What are the general arguments for nudging based on?

Nudging has been endorsed by a range of arguments identified in the literature.

Premises upon which nudging operates

Nudging has been defended on grounds of a) unavoidability and b) bounded rationality. With respect to the former, it is argued that any screening recruitment strategy has an inevitable impact on the choices that people make. It expresses some type of influence. With respect to the latter, it is argued that people are not able to make rational decisions [91]. While some argue that the evidence for our bounded rationality is wanting [92], the point has been backed by influential research in behavioural sciences [93]. Hence, as we cannot avoid choice design, or be neutral about it, we may as well be intentional about it and thus nudge.

Paternalism

Nudging has also been associated with authority and paternalism. Intentionality about nudging leads to paternalism and to the questions of what kind of paternalism and hence what kind of consent is required [12, 21, 23, 30, 48, 65, 66, 77, 87, 92, 94-110]. While paternalism has been previously the *modus operandi* in health care, it has gained less favor with the increased respect for autonomy [83, 111, 112].

Beneficence

The main pragmatic argument for nudging in screening is related to the beneficence of screening, i.e., the net benefits over risks and harms. For example, there is a broad agreement on the benefit of newborn screening for PKU, and nudging has been used to increase uptake. Increasing the uptake thus increases the overall benefit.

Deregulatory nature of nudging

Nudging is also argued to be deregulatory and efficient [13, 113], and hence, more covert, less transparent, and more difficult to monitor than traditional regulatory tools [99, 108]. If this is the case, it could also be an argument against nudging as one empirical study shows that nudges appear to undermine accountability [100].

Help “bad choosers”

Another interesting issue debated in the literature is whether people should be nudged to make informed choices [114] because, at times, people are “bad choosers” as they may choose without being informed or be under strong influence from others. Nudging can be used to improve their understanding and thus strive to make them “better choosers” – more in line with intrinsic values. For instance, it can be focused on improving the understanding of reasons for undergoing screening programs and thus be less paternalistic.

Who is nudging who?

While most of the screening literature on nudging is about health authorities or nudging the population in the interest of public health or screening providers nudging individuals, some attention is also given to patient groups or experts influencing decisions on various types of screening, e.g., through the economic models they use in health technology assessments [14]. In such second order nudging (see above), scientists may try to influence decision makers [14]. This indicates that stakeholder interests are important in assessing nudging in screening.

Table 1 Overview of results of empirical practice and theoretical issues and arguments

Empirical Practice of Nudging in Screening					
Types of screening	Prenatal screening [21-27],		Newborn screening [28, 29],		Adult screening
Examples of Conditions	Obesity [30-33]	diabetes [34, 35]	abdominal aorta aneurisms [14]	HIV [21, 37-39]	chronic beryllium disease [36]
Examples of Conditions	Various types of cancer screening [40-58], predominantly breast cancer screening [2, 59-75]				
Aim of nudging	Ensure high uptake and attendance [76]		Promote screening among decision-makers (second order nudging) [14]		
Forms of nudging	Framing information [2, 62, 65, 69, 70, 75, 77-85]	Default bias, e.g., predetermined appointments [49, 86, 87]	Screening kits sent by mail [49]	Personalized letters, educational phone calls and videos [42]	Telephone reminders [49]
	Minor monetary incentives [89]	Appeals to fear [90]	The offered service appears as a recommendation [45, 65]	Appealing to people's sense of responsibility, solidarity, and duty [45, 65]	
Theoretical Issues on Nudging (arguments on nudging and their basis)					
Premises	Unavoidability		Bounded rationality [92]		
Arguments	Any screening recruitment strategy has an inevitable impact on the choices		People are not able to make rational decisions [93]		
	Beneficence with screening [This is the main argument for nudging mentioned in most publications]		Authority, Paternalism [12, 21, 23, 30, 48, 65, 66, 77, 87, 92, 94-110]		
	Increased outcome, efficiency, deregulatory [13, 113]		Less transparent, difficult to monitor [99, 108]		
	Making better choosers [114]		Undermining accountability [100]		
Who is nudging	Health authorities / providers		Experts		
Who is nudged	The population		Decision makers		

4. Discussion and conclusion

In this article, we have reviewed the screening literature for references, discussions, and reflections on nudging. We have identified several forms of nudging (framed information, default bias, authority bias), which fit well with the general nudging literature [61, 106, 108, 115].

We have also found that nudging is discussed for a wide range of screening programs and for diverse screening target groups. This is not surprising as uptake and public health concerns are crucial to most screening programs. We did also identify several arguments for nudging in the literature, such as bounded rationality, unavoidability, and beneficence, while lack of transparency and paternalism are arguments against nudging.

4.1 Discussion

The pro and cons of nudging in screening

The main pragmatic argument for nudging in screening is its *beneficence*. While there is a wide agreement on this for PKU screening, there is less agreement with respect to both benefits and harms for other types of screening. Hence, one crucial criteria deciding on nudging in screening appears to be whether there is a large benefit-harm ratio and whether there is consensus on this.

Nudging appears to be easier to justify if the benefit is great and there is little risks of harm, which, in fact, should be the basis for justification of any screening program as such. However, no screening program is 100% sensitive and 100% specific. Hence, a specific assessment of benefits with respect to the risk of possible harm related to false positives, false negatives, and harms related to the following overdiagnosis and further unnecessary treatments has to be balanced against benefits. Some would argue that one should never offer a screening program unless the benefit-harm ratio justifies nudging. However, this would exclude a range of screening programs offered today, as their benefit-harm ratios are contested. Ideally these programs should be discarded, but it is difficult to disinvest or abolish screening programs [116]. This poses the difficult question of whether nudging is warranted in these cases. Such non-ideal situations could warrant non-ideal nudging strategies, i.e., moderating nudging ambitions when benefit-harm ratios are not favorable or contested.

Correspondingly, the ethical principle of *non-maleficence* and *justice* are relevant as well. Screening programs may harm individuals who do not benefit from participation. Hence, it can be argued that screening healthy persons violates the principle of *justice* as long as there are suffering persons that will not receive relevant treatment. While these arguments may be used against screening of healthy persons altogether, they may not be relevant against nudging in (existing) screening programs.

Another criterion appears to be to what extent people experience that nudging affects their self-determination. If people do not feel pushed in certain directions, but feel nudged to become better choosers and choose more in accordance with their explicit or implicit values, nudging may be less objectionable and more appropriate. However, this depends on how subtle the nudging is. For instance, nudging families to donate their deceased relative's organs may amount to unwarranted manipulation in an emotional situation [117]. Such can be categorized as a "shove" and not a nudge, which is more paternalistic and thus harder to justify.

The use of nudging strategies has been criticized for "crowding out" the intrinsic motivation – forcing out the natural reasons due to which people tend to participate in screenings – driven by understanding of the benefit of screening [118]. On the one hand, in Germany and England, nudging strategies were used to boost the attendance of their breast cancer screening program. In both countries, the strategies worked in the sense that they increased the turn up to screenings to 50% in Germany and 70% in England. However, only 2-4% of both German and British women understood the benefit of screening and the rest overestimated the benefit 10-fold, 100-fold, or 200-fold or did not know [43]. On the other hand, Russian women that were not nudged to participate in breast cancer screening had a lower turn up, but 18% of them understood the reasons for undergoing such screening [43]. This data suggests that nudging for the purposes of increased participation worked, but possibly crowded out the intrinsic motivation for participation in screening (knowledge of its benefits).
Another issue is related to uncertainties and continuous advances in knowledge and technology. As no preventive methods are perfect, there are uncertainties with offering screening. However, advances in knowledge or technology may continuously alter the various types of uncertainty. For example, overdiagnosis was not an issue for breast cancer screening for many years (although being present) and digital mammography has changed the accuracy of screening. Hence, public health decision-makers must update their knowledge continuously and adjust their screening programs accordingly, including their nudging strategy.

The argument that nudging is justified and even needed as we are not rational agents [108] is difficult to defend, as it justifies other types of (hard and/or strong) paternalism, e.g., shoving or compulsory screening (and not just nudging). At the same time, the arguments that we cannot avoid influencing peoples' choices by the way we inform about and offer a screening, are in line with the general literature on nudging [97, 115] and are compelling. People have different interpretations of what it means that the way choices are presented (i.e., the choice design) has an inevitable impact on decision-making. Some will argue that it means that we should be intentional and hence

paternalistic. Others will argue that we should not be intentional (and hence not nudge) and leave choice design to have its impact of people's decision-making in a random way.
As it may be very difficult to provide screening in an objective or neutral way that does not influence people's choice, the crucial question is much less whether to nudge or not to nudge, but more how to inform and apply a recruitment strategy that is ethically sound.

Lessons learned

The *first lesson* learned from the review is, therefore, that choice design may not be avoided, and that addressing it in an explicit and transparent manner is of the outmost importance. Being intentional about choice design of screening provision is better than closing our eyes [119]. Being transparent about nudging is also crucial for the sake of avoiding manipulation. A sufficient level of transparency is necessary for patients to be able to recognize that they are being nudged. Moreover, this is of great import for education, counseling and communication in health care.
The *second lesson* is that means of nudging have to be proportional to the benefit-harm ratio. If the benefit is documented to be great while the harm is low, nudging can be warranted. If the benefit-harm ratio is very low, we should of course not offer screening, while if the ratio is exceptionally high, compulsory participation may be considered (i.e., paternalism, as is the practice for PKU and extended newborn screening in some places).
The *third lesson* is that when there is disagreement on the evidence for either benefits or harms, we should be very cautious and careful. For example, a recent study shows that the published outcomes of mammography screening are highly polarized [120]. When nudging is used in cases where research data is polarized, the tool of nudging may be misused for the pursuit of one or the other goals of the contradicting "poles". In such cases one should be specifically careful to refer to results from independent sources (not identified as being polarized).
The *fourth lesson* learned is that appropriate use of nudging is context dependent [74, 121-123]. In certain cultural contexts, nudging may be counterproductive, e.g., opt-out approaches may decrease attendance rates [21]. Moreover, there may be social or cultural diversity in the target group, e.g., where persons in various social groups may experience and act on nudging quite differently [98]. Hence, context sensitivity and "tailored nudges" [124] may be important to make sure that that nudging outcomes are in accordance with its intentions.

Weaknesses of the study

As with all empirical studies, there are some weaknesses with this study. First, there may be other relevant search words or other databases that might have increased the number of included articles and the identified issues. However, as reference comprehensiveness is not within the scope of this study, the number of references is not as important as comprehensiveness in issues, reasons, and arguments on nudging in screening. With respect to the latter, the 10 lastly added references did not add any new issues. The aim of this study was neither qualitative comprehensiveness (to identify all relevant issues, e.g., nudging by phone call reminders in screening for prostate cancer), nor quantitative comprehensiveness (to identify all articles discussing such specific issues).
Second, other researchers may interpret the findings differently, and third, even if interpreted in the same manner, the findings may lead to other conclusions than what we have mad. We fully accept this, but this is why we have made this review as transparent as possible in order for others to scrutinize and discuss our work. We welcome other researchers to apply or comment on our findings.

4.2 Conclusion

This review has identified several forms of nudging in the screening literature, such as framed information, default bias, and authority bias.
We have also found that nudging is discussed for wide range of screening programs and for diverse screening target groups. Uptake and public health outcome are the most important goals. The review has also identified a wide range of arguments for intentional nudging in the screening literature, such as unavoidability, bounded rationality, and beneficence, while lack of transparency, crowding out of

intrinsic values, and paternalism are arguments against nudging. This fits well with the general nudging literature.
Four specific lessons have been learned and result in recommendations:

1. As choice design may not be avoided, we need to address nudging in an explicit and transparent manner.
2. The means of nudging have to be assessed in light of the benefit-harm ratio.
3. We should pay special attention when there is disagreement on the evidence for either benefits or harms.
4. The outcome of nudging can be context dependent, and what nudges one group towards a specific goal may have the opposite effect on others. Assessing and assuring the outcome of nudging appears important.

These recommendations are relevant for health policy makers, health care providers, councilors, and patient educators.

4.3 Practice implications

Nudging can be acceptable for screenings when following specific recommendations. However, this presupposes (high quality) evidence for high benefit-harm ratio (beneficence) and that nudging does not infringe other ethical principles, such as justice and non-maleficence. In particular, nudging should not only focus on attendance rates, but also on making people "better choosers."

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