Co-creation and Co-production in Social Innovation: A Systematic Review and Future Research Agenda

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Abstract

At the core of the concept of social innovation lies the active involvement of citizens into public service delivery. This involvement is often referred to as ‘co-creation’ or ‘co-production’. The purpose of this review is to provide an overview about the existing knowledge concerning the a) objectives, types and definitions of co-creation/co-production, b) the influential factors to co-creation and co-production processes and c) the outcomes of these processes. Furthermore we aim to identify the research gaps in this existing knowledge about co-creation and co-production in the public sector.

This article reviews 122 academic records which are selected on their eligibility, which involves the participation of citizens in the design or implementation of public service delivery; the word ‘co-creation’ or ‘co-production’ must appear in the title and/or abstract of the record; the record should contain empirical data. Furthermore we analyzed peer-reviewed records from the period of 1987-2013 and the records needed to be written in English.

As our review shows, co-creation and co-production are defined often. Both involves the active involvement of citizens in public service delivery by creating sustainable partnerships with citizens. In the literature we can make a distinction between three types of involvement: 1) citizens as co-implementer of public policy, 2) citizens as co-designer and 3) citizens as co-initiator. The first level is represented the most frequent.

Furthermore, in most records, specific objectives what the involvement must achieve are often not formulated. It appeared that most studies are aimed at the identification of influential factors. These factors can be identified on the organizational side (for instance the compatibility of public organizations, the attitude of public officials or the administrative culture) or on the citizen side (for instance personal characteristics, awareness of citizens and social capital). As a result, systematically gained empirical evidence to the outcomes of co-creation/co-production processes is often lacking. We conclude that co-creation and co-production has primarily symbolic value and seems to be considered as values in itself. Further research is required in order to examine what kind of specific outcomes co-creation and co-production processes have and under which circumstances these outcomes occur. A detailed research agenda is shown, involving methodological, theoretical and empirical lacuna’s.

Keywords: co-creation; co-production; citizens; social innovation; systematic review
1 Introduction

Social innovation and co-creation are ‘magic concepts’ (key terms which seem to be pervasive among both academics and practitioners, Pollitt & Hupe, 2011; p. 642), which during the last years have been embraced as new modernization or reform strategies for the public sector. For instance, the British prime-minister Cameron incorporated social innovation in his view on the so-called ‘Big Society’, in which he embraces the idea of social entrepreneurship and social innovation as an alternative for traditional governing. To his consideration, local communities need to have more administrative capabilities and people needs to be encouraged to play an active role in these communities in order to set up co-operations, charities, mutual and other social enterprises, in order to deal with the local and concrete needs which citizens encounter (The Guardian, 2010). Also, the European Commission has embraced social innovation as a relevant topic on her reform agenda. On their website they state that social innovation is “about new ideas that work to address unmet needs. We simply describe it as innovations that are both social in their ends and in their means” (European Commission, 2013). Social innovation seems to be an inspiring concept because it stimulates people, politicians and policy makers. It implies processes of exploration and implementation of new ideas about how a society deals, as political community, with a number of vital challenges; like the growing ageing of the population, the budgetary crises, the quality of our educational system, or the regeneration of socially and economically deprived cities and regions (Mulgan, 2009).

However, social innovation is weakly conceptualized, due to the dominance of grey, policy-oriented literature (Cels et al. 2012; Bates 2012; Mair, 2010; Mulgan, 2009; Goldenberg et al, 2009; Howalt & Schwarz, 2010). Though four elements seem to be reoccurring:

First, social innovation aims to produce long lasting outcomes that are relevant for (parts of) the society, given the needs and challenges of this (groups within) society. In doing so, it is to look beyond technological innovations and to see how social innovations create and contribute to public values that are considered to be important (Howalt & Schwarz, 2010; Hartely, 2005; Moore,1995).

Second, it fundamentally changes the social relationships and the ‘playing rules’ between the involved stakeholders. In doing so a transformative discontinuity with existing practices is pursued (Osborne & Brown, 2011), which is in general the essence of innovation. This involves a process of ‘roundaboutness’ (Majone, 1998; p. 97) or ‘institutional conversion’ (Thelen 2002; p. 224). In doing so social innovation tries to act as a ‘game changer’, thereby breaking through ‘path dependencies’. To deal with these pressing new demands and challenges, the governance capacity of a society is enhanced (European Commission, 2011; p. 33).

Third, to produce outcomes that really matter, it is important that relevant stakeholders are involved in the design, implementation or adoption of an innovation. Hence, social innovation also refers to the idea of participation of and collaboration with relevant stakeholders that cross organizational boundaries and jurisdictions (Bason, 2010; Sørensen & Torfing, 2011). This corresponds with the notion of ‘open innovation’ (Chesbrough, 2003, 2006; Von Hippel, 2005, 2007). Relevant stakeholders should be able to bring in their knowledge, information, skills, experiences and resources. As a result the produced outcomes of innovation processes are more relevant to them.
This presupposes that these stakeholders, given their needs, are able to co-create in innovations that really matter to them. Moreover, special attention should be paid to these needs of end-users.

Last, social innovation refers not only to the production of new outcomes but also to the process of innovation. This process can be seen as a learning and reflection process (Albury, 2005). This is not an isolated instance, which can be exclusively attributed to capacities and capabilities of a specific person (the entrepreneur as Schumpeter [1942] presumed). Neither is it a systematic process of research and development that has been institutionalized in a laboratory or a R & D department (like Drucker, 1985 assumed). Innovation processes require the ability and willingness of the relevant actors to cooperate and to link and share ideas, as well as to exchange vital resources, such as staff. It refers to the rather free and interactive exchanges of knowledge, information and experiences, in which new ideas and concepts are discussed in intra- and inter-organizational networks (Chesbrough, 2003, 2006; Von Hippel, 1976, 2005, 2007). However, this open innovation process is an embedded process, which takes place in a specific local and institutional context (Bekkers, Edelenbos & Steijn, 2011). This implies that it is important to recognize the specific environment in which innovation processes take place. That is why Castells (1996:3) mentions ‘innovation milieus’. It can, thus, be argued that innovation processes should be studied from an ecological perspective (Bekkers & Homburg, 2007; Bason, 2010; Osborne & Brown, 2011).

So, to put it differently, social innovation can be considered as a process of co-creation. Thereby referring to the involvement of stakeholders, in particular end-users in the design and development of new goods and services (Von Hippel, 2007). In the private sector, co-creation can be understood in relation to two simultaneous trends. First, corporations are challenged to produce their goods more and more efficiently, thereby looking for opportunities to create efficiency gains outside the borders of the own organization. In this, end-users are defined as possible co-producers that take over specific activities in the production chain (Prahalad & Ramaswamy, 2000; Vargo & Lusch, 2004). Second, end-users may also be perceived as co-creators, whose experiences and needs can be of added value for a company to improve, redesign or invent new products and services (Vargo & Lusch, 2004). Therefore, customers are not only an important source of information, they are also an importance source of competence, given the fact that customers learn while using a product or service (Prahalad & Ramaswamy, 2000). Research in the private sector has shown that the level of co-creation positively influences customer satisfaction, customer loyalty, lowering of service expenditures (costs, knowledge) as well competitive advantage (Grisseman & Stokburger-Sauer 2012; Chathoth et al., 2012; Barrutia & Echebarria, 2012[1]).

But, since social innovation and co-creation are being incorporated in the public sector, it is important to note, that in contrast to the private sector, in the public sector an important purpose behind social innovation is the involvement of service-users as such, in order to create new public services. This fundamentally challenges existing, very often supply-based services. According to the European Commission (2011; p. 30) “social innovation mobilizes each citizen to become an active part of the innovation process”. But, when citizen participation is considered as such a necessary condition, what do we know about the conditions under which citizens are prepared to embark on the ‘social innovation journey’ (cf. Van de Ven et al., 2008)? In order to address this question, we conducted a systematic review of the academic literature of public co-creation with citizens. The public sector has a specific history, starting in especially the 1980s, with involving citizens in policy making, policy implementation and service delivery processes. In this type of literature the concept
of co-production seems to be recurring (e.g. Verschuere, Brandsen & Pestoff 2012; Brandsen & Pestoff, 2006; Alford, 1998; Ostrom, 1996). Lusch & Vargo (2006) described co-creation and co-production as two aspects of a more service oriented production process. Following that notion, some authors see the both concepts as interchangeable (e.g. Rosentraub & Warren, 1987; Gebauer et al. 2010). Other records define co-creation as such that there is no distinction with the used definitions on co-production (see also section 4.2). Hence, results from the co-production literature can also help to understand how valid the co-creation assumptions are behind many social innovation practices. Therefore our systematic review not only includes the literature on public co-creation, but also public co-production (see for an a recent overview Verschuere, Pestoff and Brandsen, 2012).

Our review adds to the literature in two ways. Firstly, we take into account both the co-creation and co-production literature. Our article aims to provide an overview regarding the role of citizens in the co-creation/co-production processes in social innovation. Secondly, we base this review on systematic review guidelines, which compromises several explicit and reproducible steps, such as identifying all likely relevant publications, selecting eligible studies, extracting data from eligible and high quality studies and synthesizing the results (Liberati et al., 2009). Systematic reviews differ from more traditional literature overviews as it is a replicable and transparent process (Trenfield et al. 2003). When reporting this systematic review, we will adhere as much as possible to the widely used ‘Preferred Reporting Items for Systematic Reviews and Meta-Analyses’ (The PRISMA Statement), ensuring transparent and complete reporting (Moher et al., 2009; Liberati et al., 2009).

We propose to answer three related questions:

1) What are the objectives of co-creation and co-production with citizens and what are relevant types of co-creation?
2) Which factors influence co-creation and co-production processes with citizens?
3) What are the outcomes of co-creation and co-production processes with citizens?

In the following section we will assess the methodology used to conduct the review. Here, we will present our eligibility criteria, the kind of databases we examined and the used search strategies. Hereafter we present the results of our review. We conclude our analysis with some reflections on co-creation and co-production in social innovation processes. Based hereon, we present a future research agenda on co-creation and co-production in innovation processes.
2 Research Strategy: conducting a systematic review

2.1 Study and report eligibility

In order to conduct our review, we present in this section the criteria which we have used to identify the eligible records, the search strategy and our selection procedure.

PRISMA distinguishes study eligibility and report eligibility criteria (Liberati et al., 2009). Study eligibility criteria include for instance the type of participants (citizens, public managers, NGOs etc.) and the study design, such as a survey or a case study. Report eligibility criteria include for instance the language in which the report is written and the type of reports included (journal articles, dissertations, congress papers, etcetera). We used the following eligibility criteria:

Study eligibility criteria

- **Type of studies** – Records should deal with co-creation or co-production with citizens during the design or implementation of public service delivery processes. The public sector was defined broadly as “those parts of the economy that are either in state ownership or under contract to the state, plus those parts that are regulated and/or subsidized in the public interest” (Flynn, 2007; p. 1).
- **Topic of co-creation/co-production** – Records should contain the words co-creation or co-production in their title and/or abstract, in order to prevent mix up with related concepts.
- **Type of participants** – The participants in the co-creation process should minimally be citizens – or their representatives – and civil servants.
- **Study design** – Only empirical studies are eligible, as we are interested in the empirical evidence on co-creation during social innovation. All types of designs are included (questionnaire, case study, experiment).

Report eligibility criteria

- **Language** – Only reports written in English were taken into account. For systematic reviews, it is common to only select studies written in English, given the practical difficulties of translation and the replicability of the review (Wilson et al., 2003).
- **Publication status** – We only include international peer-reviewed journal articles in our analysis, or books from well-established publishers on the field of public administration (such as Routledge, Edward Elgar, Oxford University Press).
- **Year of publication** – We retrieve records which are published between 1987 and 2013. 1987 is chosen as this is the publication year of the seminal work of Von Hippel (1987), on which much of the research on innovation builds. 2013 is chosen since it generates the most present studies on the topic of co-creation or co-production.

2.2 Search strategy

In order to locate studies, four strategies were used. First, studies in electronic databases were searched (1987-2013). This search was applied to Scopus and ISI Web of Knowledge. The last search was run on May 20, 2013. Topics that were used in searching the databases included [citizens], [social innovation], [co-creation], [co-production], [public sector] and [value-creation]. After searching
for the studies, the studies were assessed based on their eligibility. The studies were screened on title and abstract and – when needed – by reading the full text. Second, we conducted the same search to the top tier Public Administration Journals (PA journals). These were Public Management Review; Public Administration; Journal of Public Administration, Research and Theory; Administration and Society and Public Administration Review. Third, we analyzed the books on co-creation or co-production. In ‘Google Books’ we searched for related contributions. Next to the topics mentioned above, we selected books published only by (known) academic publishers. Fourth, we contacted known experts in the field of co-creation/co-production to supplement our literature list with important records (see acknowledgements).

2.3 Record selection

In total we screened 5,381 studies (1,337 on co-production, 4,021 on co-production). We used Scopus and ISI Web of Knowledge to identify the contributions which matches our eligibility criteria. Since one of our eligibility criteria is peer reviewed articles, we needed to avoid a mix-up with ‘grey’ literature. Therefore, Scopus and ISI are more suitable than for instance Google Scholar. After this screening procedure of the articles from these two databases, the Public Administration Journals, the academic books and the consultation of the known experts, this ultimately led to the inclusion of 122 studies (27 on co-creation and 95 on co-production). Our selection process is presented in figure 1.
In the next section we will describe the results of our systematic review.
3 Results of the systematic review

3.1 Record characteristics

Before discussing the results we will address a number of characteristics of the records that we found.

Diversity in journals and publishers

Articles which are dedicated to co-creation/co-production are published in a large number of different journals. The journals which contained the most studies on co-creation/co-production were Public Management Review (9), International Journal of Voluntary and Nonprofit Organizations (7), World Development (6) and Environment Science & Policy (4). Next to these journals a number of other journals published articles dedicated to co-creation/co-production, but this involved only one or two contributions. These included for instance ‘traditional’ public administration journals, such as Journal of Public Administration, Research & Theory and Administration & Society, but also a number of other journals such as Criminology & Criminal Justice, Journal of Leisure Research and Health & Place.

When we look to the different publishers, it turns out that well established publishers in the field of public administration have not quite discovered the topic of co-creation/co-production yet. We found only one record on public co-creation published by a well-established publisher (Bason, 2010) and on the topic of co-production, publisher Routledge edited four records, which is the highest number of records edited by one publisher. Combined with our observation that most journals appeared only once in our database and since the journals which have published the most on co-creation/co-production, delivered maximally nine results, we can state that the topic is not extensively studied yet in any academic discipline.

Diversity in studied policy sectors

It appeared that co-creation/co-production has been studied quite extensively in the health care (30 records) and educational (15 records) sector. Next to that a large variety of policy sectors, such as regional media (Kerrigan & Graham, 2010), library services (Somerville & EchoHawk, 2011) and garbage disposal (Benari, 1990) were included in our review. Hence, the conclusion is that co-creation and co-production is a practice that can be found in numerous policy sectors, although health care and education are dominant. This may be explained by the more direct relation between citizens and public officials in these sectors, compared to other sectors such as water governance.

3.2 Definitions, types and objectives

Types of co-creation/co-production

The following table presents the different types of co-creation/co-production that came across during our systematic review. We distinguished three different levels of participation: Level 1 involves the citizen just as co-implementer of the public service. In these examples citizen involvement has already been defined by the public service. For instance Benari (1990) described the need for participation of citizens in garbage disposal services. In order to effectively divide garbage,
assistance of citizens is required to already divide garbage at their homes. Level 2 approaches the citizen as co-designer of how the product or service should be delivered. In most case the initiative for the co-creation lies with the public institution, but citizens decide how the service is being delivered. A typical example of ‘level 2 participation’ is given by Wipf et al. (2009) who described how citizens in France participated in the design and maintaining of outdoor recreation. Citizens got to co-decide how the outdoor recreation was being designed, after the invitation of the municipalities. The third level represents the citizen as initiator and the government as supporting (or frustrating) actor. A remarkable example of this kind of participation is delivered by Rossi (2004) who described that because of civil initiative, the historical center of Naples reopened for the public and the monuments were restored.

In analyzing these different levels of participation we make a distinction between the results of the two different bodies of knowledge that have been analyzed: co-creation and co-production.

<table>
<thead>
<tr>
<th>Level</th>
<th>Co-creation</th>
<th>Percentage</th>
<th>Co-production</th>
<th>Percentage</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-implmenter</td>
<td>15</td>
<td>51%</td>
<td>53</td>
<td>50%</td>
<td>68</td>
<td>50%</td>
</tr>
<tr>
<td>Co-designer</td>
<td>7</td>
<td>24%</td>
<td>30</td>
<td>28%</td>
<td>37</td>
<td>27%</td>
</tr>
<tr>
<td>Initiator</td>
<td>4</td>
<td>14%</td>
<td>10</td>
<td>9%</td>
<td>14</td>
<td>10%</td>
</tr>
<tr>
<td>No specific</td>
<td>3</td>
<td>11%</td>
<td>14</td>
<td>13%</td>
<td>17</td>
<td>13%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
<td>107</td>
<td>100%</td>
<td>136</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1: types of co-creation/co-production

In some cases the author conducted a multiple case-study in which different types of co-creation/co-production has been studied. As a result the total number of studied levels is higher than the total number of records (a total number of 243).

The most important conclusion that could be drawn from these tables is that the empirical distinction between co-production and co-creation does not so much depend on the type of citizen involvement. In both bodies of literature, the citizen as co-implmenter has been studied the most (in both bodies of literature around 50%). Furthermore we see in both bodies of knowledge that the dispersion between the different levels is rather equal. This rejects the assumption (in line with Bason, 2010) that in the co-creation literature the emphasis is more put on the citizen as co-designer, while in the co-production literature the emphasis lies the citizen as co-implmenter (or co-producer). We can conclude that co-creation and co-production are concepts which are closely linked to each other. This will be discussed more specifically in the next subsection. Other peculiar observations are, that a relative large number of authors (13%) did not mention a specific level of co-creation/co-production. This was due to the fact that those cases just described whether co-creation/co-production has occurred. No detailed assessment of the specifics of citizen involvement was then described in the case.

Since the empirical difference between co-creation and co-production seems to be limited, it is important to look whether definitions of co-creation/co-production are also similar. We examine this issue in the next session.
**Definitions**

In some cases, authors (19%) did not present a specific definition at all. This could have two reasons: 1) in some studies, co-creation with citizens, was not the main subject of study. Some authors present the topic of co-creation merely as an explaining factor to understand policy effectiveness (e.g. Cairns, 2013). 2) The absence of a definition can be related to how the study is conducted. Some studies tried to assess co-creation from a more practical perspective. Then a specific definition was not given.

Then, when we compare the records which did define co-creation/co-production, both co-creation and co-production are to a large extent similarly defined. In both bodies of literature the citizen/end-users is being considered as a valuable *partner* in public service delivery (e.g. Cairns, 2013; Baumer et al. 2011 on co-creation and Meijer, 2012; Bovaird, 2007 on co-production). We have seen some variations to this partnerships, such as the creation of sustainable relations between government and citizens (e.g. Ryan 2012; Joshi & Moore, 2004), the joint responsibility of professionals and citizens for public service delivery (e.g. De Witte & Geys, 2013; Lelieveldt et al. 2009) or simply the involvement of citizens in the process (design, production or delivery) of public service delivery (e.g. Jakobsen, 2013; Davis & Ruddle, 2012; Ostrom, 1996). The only main difference in definitions between co-creation and co-production is that, in line of the work of Vargo & Lusch (2004), in the co-creation literature is sometimes defined as *value* co-creation (e.g. Briscoe et al. 2012; Gebauer et al. 2010).

So, again we can conclude that, to a large extent the concepts of co-creation and co-production can be considered as closely related to each other and even to some extent interchangeable. In the remainder of our analysis we consider co-creation and co-production as comparable and we take the two bodies of literature together.

**Objectives**

The following table shows the number identified objectives that practices of co-creation/co-production must achieve.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaining more effectiveness</td>
<td>22</td>
<td>18%</td>
</tr>
<tr>
<td>Gaining more efficiency</td>
<td>13</td>
<td>11%</td>
</tr>
<tr>
<td>Gaining customer satisfaction</td>
<td>10</td>
<td>8%</td>
</tr>
<tr>
<td>Increasing citizen involvement</td>
<td>8</td>
<td>7%</td>
</tr>
<tr>
<td>Other objectives</td>
<td>5</td>
<td>4%</td>
</tr>
<tr>
<td>No objective mentioned</td>
<td>64</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>122</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2: Objectives

The most remarkable finding is that most contributions did not mention a specific objective for co-creation and co-production. This review shows that there seems to be an implicit conviction that
involvement of citizens is a virtue in itself, like democracy and transparency. Citizen involvement is considered, in a normative way, as something that is appropriate. This assumption is strengthened by the fact that in eight different studies the purpose of co-creation/co-production is simply the involvement of citizens and democratize public services (e.g. Bifulco & Ladd, 2006; Anderson & Clary 1987; Lelieveldt et al. 2009).

Other peculiarities are that if authors have identified an objective this is mostly related to financial cutbacks or the wish to deliver public services more effectively. Interesting is that these aims seem to be ‘timeless’. Since 1987 we found in all decennia at least one record which identified efficiency gains as the dominant purpose for co-creation/co-production. For instance, Anderson & Clary (1987) already mentioned it in 1987, as did Molinas in 1998. Fuglsang identified the same objective in 2008 and more recent contributions of Glynos & Speed (2012) and Evans et al. (2012) mentioned comparable objectives. Next to that, objectives are mentioned, in line with Vargo & Lusch (2004) which are related to making public service delivery more service and customer-oriented. Related objectives are gaining more quality in public services (e.g. Jakobsen et al. 2013; Meijer, 2011; Lam, 1996) and creating more customer satisfaction (e.g. Bowden & D’Allessandro, 2011). Taken these different objectives into consideration, it is interesting what kind of factors the achievement of these objectives influence. We present the factors that we have identified in the literature in the next section.

3.3 Influential factors

Our analysis generated a large variety of influential factors. We categorized these factors inductively into eight different categories (table 3). These factors are sometimes formulated as supporting and sometimes as frustrating. We consider the supporting or frustrating nature of these factors as ‘two sides of the same coin’. For instance a number of records mentioned the acceptance of the citizen/patient as key driver for successful establishing co-production relations (e.g. Leone et al. 2012; Ryan, 2012; Corburn, 2007). On the other hand also a number of authors identified an averse attitude towards citizen participation (e.g. Bovaird & Loeffler, 2012; Vamstad 2012; Ackerman, 2004; Kingfisher, 1998). Both factors report about the attitude of public officials to civil involvement.
The identified influential factors can be distinguished into two different types: factors on the organizational side and factors on the citizen side.

To start with the organizational side, in the first place, most mentioned influential factors are related to the compatibility of public organizations to co-creation/co-production. This may refer to the presence or absence of inviting organizational structures and procedure’s within the public organization (e.g. Bovaird & Loeffler, 2012; Andrews & Brewer, 2013; Meijer, 2011; Bifulco & Ladd, 2006; Joshi & Moore, 2004) or the presence or absence of a decent infrastructure to communicate with citizens (e.g. Davidsen & Reventlow, 2011; Davis & Ruddle, 2012; Molinas, 1998).

Second, a large number of authors mentioned that the attitude of public officials and politicians influence to what extent co-creation/co-production occurs (e.g. Leone et al. 2012; Davis & Ruddle, 2012; Cassia & Magno, 2011; Gebauer et al. 2010). For instance, Ryan (2012) emphasized that the key pre-condition to the co-production of public safety, was the prior acceptance of the legitimate right of the client to be a partner in the process. Formulated as a frustrating factor, Roberts et al. (2012 [2]) mention that many politicians, managers and professionals consider co-production as unreliable. The behavior of citizens is less understood and is considered as more unpredictable. Therefore political and professional reluctance to lose status and control makes that the attitude to embrace co-creation/co-production is often unwilling.

Third, a number of authors have described the administrative culture in which co-creation must be established as risk-averse, conservative and not aimed at incorporating citizens as reliable resource partners (e.g. Talsma & Molenbroek, 2012; Calabro, 2012; Baars, 2010; Mitlin, 2008; Hyde & Davies, 2004). Because of the lack of tradition to consider citizens as associates, rather than service-receivers, makes that there is no ‘institutional space’ to invite citizens as equals (Maielloa et al. 2013). In relation to the preceding factor ‘attitude’, the administrative culture can be considered as the environment which shapes the attitudes of public officials.

Fourth, a large number of authors mentioned the importance of having clear incentives for co-creation with citizens. For instance to public officials it is unclear to what extent public services are

<table>
<thead>
<tr>
<th>Influential factor on organizational side</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility of public organizations to citizen participation</td>
<td>47</td>
</tr>
<tr>
<td>Open attitude towards citizen participation</td>
<td>23</td>
</tr>
<tr>
<td>Risk averse administrative culture</td>
<td>19</td>
</tr>
<tr>
<td>Presence of clear incentives for co-creation (win/win situation)</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Influential factors on citizen side</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizen characteristics (skills/Intrinsic values/marital status/family composition/level of education)</td>
<td>10</td>
</tr>
<tr>
<td>Customer awareness / feeling of ownership / being part of something</td>
<td>9</td>
</tr>
<tr>
<td>Presence of social capital</td>
<td>9</td>
</tr>
<tr>
<td>Risk aversion by customers/patients/citizens</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3: Dominant Influential Factors
being improved by incorporating citizens (e.g. Evans et al. 2012; Joshi & Moore, 2004), or creates budgetary benefits (Abers, 1998), or even increases customer interest (Lam, 1996). Without clarity about the incentives of working with citizens, especially in terms of efficiency and effectiveness administrators do not see the use in it (e.g. Wise et al. 2012; Van Dijck & Nieborg, 2009; Fuglsang, 2008).

Important is to note that all of these mentioned factors are not restricted to a specific policy domain, but involves a large variety of policy sectors. Whether the citizen is regarded as ‘co-producer of safety’ (Weaver, 2011), ‘co-producer of knowledge’ (Evans et al. 2012), ‘patient’ (Lindahl et al. 2011) or ‘student’ (Díaz-Méndez & Gummesson, 2012), these factors seem to be highly influential.

The described factors so far can all be related to the organizational ‘side’ of co-creation and co-production. Next to this, some authors identified influential factors on the side of the citizen.

First, it appeared that characteristics of citizens play an important role in whether citizens are willing to participate. Wise et al. (2012) showed that intrinsic values such as loyalty, civic duty and the wish to improve the government affects positively the willingness of citizens to participate. This willingness is affected by individual characteristics, such as education and family composition. For instance, Sundeen (1988) showed that the level of education plays an important role in explaining the willingness to co-produce. People who have gone beyond high school are informed better and are more aware of community needs. Furthermore, they are better prepared to articulate their own needs and possess the required administrative skills to participate.

Second, a number of authors have identified the importance of citizens have to be aware of their ability and the possibilities to influence public service delivery. Talsma & Molenbroek (2012) showed from their study to Indian ecotourism, that because of a feeling of being responsible for the wellbeing of eco-tourists (sense of ownership) local people putted a lot of efforts in the improvement of this service. Another example is given by Gebauer et al. (2010) who showed that because of the active involvement of customers in improving the public transport, people had the feeling they could influence the quality of the service. Therefore they improved their level of involvement. So, next to the fact that people needs to be willing to participate they need to be aware how and where they can influence public services.

Third, social capital is needed for participation. Ostrom (1996) mentions that in order to sustainably involve citizens in infrastructure projects in Brazil, not only is activation of citizens required, also social capital needs to be energized in order to fulfill the promises of collective action. Subsequently, Schafft & Brown (2000) showed that the local organization of social capital made that Hungarian Romas were able to initiate a large number of profitable projects for their community. By the enforcement of social capital people looked after each other and had the feeling that they were not alone in their minority-position. So, social capital became an important ingredient in order to create (sustainable) commitment with participation.

All these factors, although presented here in distinct categories are of course related. We present this correlation in figure 3. Within a risk-averse administrative culture, it seems plausible that the attitudes of public officials is averse to citizen participation. Hence public organizations lack the practical organizational tools which are required for active citizen involvement. The outcome of this sequence is that if co-creation processes are not started within the organization, measures are
required in order to establish relationships with citizens. We describe the measures which came across in our review in the next sub-section.

3.4 Identified measures

The measures mentioned in the academic literature can be both aimed at the barriers on the organizational level as on the citizen level. Measures on the organizational side refer for instance to a (top-down) policy which supports co-creation/co-production (e.g. Carr, 2012; Pestoff, 2009). Furthermore, a policy entrepreneur needs to be appointed in order to promote the co-creation/co-production initiative (Farmer, Hill & Munoz, 2012; Briscoe et al. 2012; Fuglsang, 2008). Other authors refer that in order to let co-creation/co-production initiatives succeed, the enhancement of the discretionary autonomy for professionals is required (e.g. De Witte & Geys, 2013; Gill et al. 2011).

On the citizen side measures which are repeatedly mentioned involve the lowering of thresholds for citizens to participate. This can refer to a lowering of the participation costs (Weinberger & Jutting, 2001) by financial support (Pestoff, 2006). Also here an inviting policy is mentioned. In this case, the policy needs to generate a feeling of ownership (e.g. Lindahl et al. 2011; Ostrom 1996). Last, when public organizations or officials approach citizens to participate, they should offer them a plebiscitary choice, instead of asking them about complicated policy issues (Wise et al. 2012).

Peculiar is that these measures are formulated as ‘something that the public organization must do’. Whether it refers to an adaption on the organizational side or an attempt to influence citizen behavior, the responsibility lies with the public organization. We conclude therefore, that the success of co-creation/co-production is regarded as a responsibility of the public organization.
Figure 3: Correlation between identified influential factors

Organizational Side

- Compatibility of public organizations to citizen participation
- Attitude of public officials to citizen participation
- Risk-averse administrative culture
- Clear incentives for co-creation/co-production

Measures:
- (Top-down) supporting policy
- Policy entrepreneur
- Enhanced professional autonomy

Citizen Side

- Citizen characteristics
- Customer awareness
- Presence of social capital
- Risk Aversion by customer/patient/citizen

Measures:
- Financial support
- Supporting policy which supports a sense of ownership
- Offering plebiscitary choice
3.5 Outcomes

In this section we analyze what kind of outcomes are presented in the literature. Based on the review, we can distinguish two categories of study outcomes: 1) results formulated as a specific outcome to an objective which co-creation/co-production must obtain (outcomes) and 2) results which are not formulated as a specific outcome of co-creation/co-production (no-outcomes).

To start with the latter (since it is the largest category), we found out that most authors did not present specific outcomes in their study results. We present the different types of ‘no-outcomes’ which came across in our review in table 5.

<table>
<thead>
<tr>
<th>Type of ‘no-outcome’</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related to Influential factors</td>
<td>44</td>
<td>45%</td>
</tr>
<tr>
<td>Referring to underlying general values</td>
<td>32</td>
<td>33%</td>
</tr>
<tr>
<td>Occurrence of co-creation/co-production as such</td>
<td>22</td>
<td>22%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>98</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 5: types of no-outcomes

We can observe some peculiarities. First, most authors dedicated their study at either identifying what kind of factors influence co-creation processes. A remarkable example of such a study is given by Alford (2002) who researched the effects of different incentives (sanctions, material rewards, non-material rewards) to participation behavior of clients of social welfare programs.

Second, another group of authors formulated the outcomes in relative general terms, related to what extent co-creation/co-production enhances the underlying assumptions and general values. An example of this category is delivered by Calabro (2012) who compared privatization processes in Italy and Norway. He concluded that ethical and accountable procedures are sporadic in both countries. Greater levels of citizens participation might contribute to these processes. In this example he studied how co-production might add to values as accountability and democracy.

A last group of authors aimed their studies at the identification of the different types of co-creation or co-production. The object of study becomes then, whether co-creation/co-production has occurred as such. For instance Pestoff (2009) examined what kind of different levels of participation of parents in childcare services can be distinguished in different EU countries. As a result parent participation within different forms of provision, i.e., public, private for-profit and third sector childcare.

A number of authors did describe specific outcomes, related to the co-creation/co-production process. From the 122 selected records, twenty-four authors reported on specific outcomes which co-creation/co-production has achieved. We present the different outcomes in relation to the formulated objectives (table 2) in table 6.
<table>
<thead>
<tr>
<th>Type of outcome</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaining more effectiveness</td>
<td>14</td>
<td>59%</td>
</tr>
<tr>
<td>Increasing citizen involvement</td>
<td>6</td>
<td>25%</td>
</tr>
<tr>
<td>Gaining more efficiency</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Gaining customer satisfaction</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Other objectives</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>24</td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 6: types of outcomes

The table shows that if a concrete outcome was formulated this mostly involves the increase (or decrease) in effectiveness. A resembling example of improved effectiveness is delivered by Leone et al. (2012). They described that because of co-producing health care for heart failure patients, quality of treatments increased. Other concrete positive examples involves the enrichment in knowledge gaining, by including farmers. Baars (2011) shows that by incorporating farmers as specialists on the field of organic farming, knowledge about how to organize and maintain organic farming is easily be gathered. On the other hand Benari (1990) showed that co-production in garbage disposal in Japan did not generate any positive outcomes. People simply did not divide their waste into different garbage types. Furthermore, Meijer (2012) showed that co-production is not to be considered as something that directly leads to a more safe neighborhood. Merely should it be regarded as a tool which enriches the information on which police actions are based.

We can conclude from this analysis, that there is not much systematically empirically gained data about the outcomes of co-creation/co-production processes available (see also Alford, 2009). Most studies are dedicated to drivers and barriers and the identification of different co-creation types. Subsequently, based on the outcomes which we have identified, we are not able to conclude whether co-creation/co-production can be considered as beneficial. Last, our observation that co-creation has become a virtue in itself and therefore a (normative) value which must be strived for are strengthened by the number of reported ‘no-outcomes’. This is underlined by the large number of authors who described just the emergence of co-creation/co-production as such and the number of authors who described benefits of co-creation/co-production in terms of civil participation. In this, the suggestion appears, in line with Osborne (1998; p. 35), that the symbolic value of co-creation must be considered as equally significant, as their actuality.
4 Conclusion: Implications for social innovation

Co-creation and co-production in social innovation are considered as promising concepts in order to address the challenges of contemporary Western governments. In this article we conducted a systematic review in order to examine what is being considered in the literature as the objectives of co-creation/co-production, the different types which can be distinguished, the influential factors to it and the outcomes of co-creation/co-production processes. We can draw some conclusions.

4.1 Conclusions of our review to public co-creation/co-production

With regards to how co-creation and co-production are defined we observe that all of them include citizens/end-users/patients as participants to public service delivery. The definitions show some variation. This variation can be distinguished in three types: 1) citizen as co-implmenter, 2) citizen as co-designer, 3) citizen as co-initiator. In our analysis it appeared that in both bodies of literature the notion of the citizen as co-implmenter is represented the most. Next, in the co-creation literature, citizen involvement is often defined as value co-creation. Such a notion is not found in the co-production literature. We conclude that no conceptual distinction is being made between co-creation and co-production, based on the used definitions and types of citizen involvement.

When we look at the objectives that co-creation must achieve, the most remarkable observation is that in more than half of the eligible contributions, no objective is mentioned why public services should make co-creation/co-production efforts. From this we conclude that co-creation has become a value in itself. This is certified by the observation that a large number of authors mentioned the increase of citizen involvement as an objective as such. Other mentioned objectives involved values such as being more effective, gaining more efficiency and create more customer satisfaction. This lack of clear objectives is predominantly caused by the research aim of the study. In most records the objective of the study was to identify influential factors to co-creation/co-production processes (44 records). It becomes then important to examine what kind of influential factors are being identified.

In our review these influential factors can be identified on both the organizational side and the citizen side. On the organization side, most of them involve the ‘compatibility of public organizations to citizen participation’. This may refer to a proper communication infrastructure or training facilities for both citizens as public officials. Another important factor is the attitude of administrators and politicians to involve citizens as valuable partners. As it turns out, most authors identified that these attitudes are often not really inviting to citizen involvement. A third important factor seems to be the risk averse culture of public sector organizations. Civil involvement is traditionally regarded as uncontrollable and unreliable. Therefore the administrative environment is not aimed at incorporating citizens in public service delivery.

On the citizen side, influential factors can be identified which influence the willingness to participate. This involves education level, family structure and personal characteristics. Next to this willingness, citizens need to be aware of their ability and possibility of actually influence public services. A last import influential factor seems to be the presence of social capital. Social capital is required in order to create sustainable relations between public organizations and citizens.
It is important to note that these factors are of course related and must be considered as subsequent to each other. If these factors seem to be lacking (on both the organizational and on the citizen side), the responsibility to succeed co-creation/co-production initiatives lies with the public organization. We draw this conclusion, since the additional measures which came across, all refer to ‘something that the organization must do’. Examples of these measure are the assignment of a policy entrepreneur, implementing supportive policy or financial support.

In our review, we wanted to know what the outcomes are of co-creation/co-production processes with citizens, given the objectives and influential factors. It appeared, however, that most authors did not mention in very concrete terms what kind of objectives are being achieved by co-creative efforts. This shows that there is not so much systematically gained empirical evidence with regards to the promised benefits of collaboration with citizens. Mentioned outcomes are often circumstantial in their nature or are related to general underlying values, or are just referring to whether co-creation/co-production has occurred. Only twenty-four of the analyzed 122 records described specifically what kind of effects co-creation/co-production had on a specific case. We conclude that the literature so far is not primarily aimed at identifying outcomes of co-creation/co-production processes.

4.2 Limitations of the review

Of course our methods have some limitations. First, we used separate approaches in order to generate a comprehensive overview of the current literature of citizen involvement in public service delivery. However one of our selection criteria was that the record should contain the word ‘co-creation’ or ‘co-production’ in the title or abstract. It might be possible that studies are dedicated to the topic of co-creation/co-production but did not mention the words in their abstract or title. As a result some valuable knowledge may still be unexamined.

Second, we already concluded that the concepts of co-creation and co-production are interchangeable to some extent. In the literature about citizen involvement, other bodies of knowledge are available around the concepts of ‘interactive governance’ (Sørensen & Torfing, 2005), ‘new public governance’ (Osborne, 2005), ‘open innovation’ (Chesbrough, 2003) and ‘community participation’ (Craig & Mayo, 1995). It might be that these concepts refer to the same phenomenon as co-creation or co-production. Given the extent of this study we are not able to draw some conclusions on this.

4.6 Future research agenda

From our review we are able to identify a number of research gaps in the co-creation/co-production literature. These gaps can be formulated along three research lines:

1. Methodological
   The now existing literature on co-creation and co-production relies to a great extent on (single)case studies. This is understandable since the assumed importance of contextual factors to co-creation/co-production processes during social innovation. However, generalizing value is limited with these processes. In order to understand public co-creation during social innovation processes, new research approaches are required. First of all, the comparison between cases from different countries can show to what extent national
specifics such as state tradition or governance structure are influential to co-creation processes (see also Verschuere et al. 2012). Second, more quantitative approaches may show to what extent the influential factors derived from the case-studies have general value. For instance, the attitudes of public officials may vary between regions and/or policy domains. Last, in order to really examine what the causal effects of co-creation processes are experiments are required. This should prove whether for instance user satisfaction is improved because of participation in public service design or to other factors.

2. Theoretical
In our review we have considered co-creation and co-production as strongly related. The conceptual lines between other concepts seems to be thin. Conceptual clearance seems to be required. Given the rather large number of studies conducted to cases in which the citizen act as co-implementer, we suggest that we need to have better understanding of the effects of citizen involvement as co-designer or initiator.
In addition to the first point, as we have shown, the current literature is aimed at identifying what kind of co-creation/co-production types can be distinguished and what influential factors are. As a result, still much is unknown about the outcomes of collaboration processes with citizens. Future research is required in order to conclude whether: a) the underlying assumptions about the benefits of co-creation are correct, b) under which circumstances certain outcomes of co-creation may occur and c) to what extent these outcomes are long-lasting.

3. Empirical
As our review has shown, so far most empirical data in the literature is derived from records within the education and health care sector. Given the traditional direct relation between service provider and service user this is not surprising. However since citizen involvement gained popularity in other policy sectors as well, it seems prudent to expand this body of knowledge with other domains. Future research must conclude to what extent the policy field in which co-creation is implemented is influential to the type and effects of these processes.

4.7 Reflection
The results of this review are interesting, especially if we compare the assumptions behind the role of co-creation in social innovation and the reported objectives and outcomes of co-creation/coproduction in the academic literature. Policy makers have often high expectations of co-creation in public innovation, but actual results are hardly reported. What does this imply for the added value that is attached to co-creation in social innovation? Answering this question seems to depend on the perspective on (social) innovation and co-creation/co-production. If we use a rational, functional or goal-oriented approach, the outcomes seem to be somewhat disappointing. Co-creation and co-production processes are often not studied in such a linear approach with a beforehand defined objective, an approach how to obtain this objective and a conclusion whether this objective is achieved or not. However, we could also argue that the added value of co-creation/coproduction should be assessed from a more cultural or institutional perspective in which innovation and co-creation/coproduction is being defined as a process of sense making. Co-
creation/coproduction can be seen as the development of a repertoire that policy makers and organizations develop to convince their external environment, that the organization or their policies make sense (Weick, 1969; 1995). Co-creation processes are important symbolic processes in which an organization tries to establish a process of normative integration between the central and dominant values and developments which are important in the environment of the organization and the values that are important in the organization (DiMaggio & Powell, 1983; 1991). Co-creation in public innovation can therefore be considered as a process in which the involved stakeholders within and outside an organization try to develop a new, common frame in order achieve legitimacy. Feller (1981) has called this process of normative integration ‘conspicuous production’. In this the notion of Meyer & Rowan (1977) is embedded that the adoption of a co-creation approach can also be seen as a myth or ceremony to which organizations have to comply in order to guarantee their legitimacy towards their external and internal environment.
Acknowledgement

In order to conclude our research and to complete our database of relevant records, we have consulted a number of experts in the field of co-creation/co-production. The consulted experts are prof. Tony Bovaird of the University of Birmingham (United Kingdom), prof. Taco Brandsen of the Radboud University Nijmegen (the Netherlands), prof. Victor Pestoff of the University of Östersund (Sweden), prof. Stephen Osborne of the University of Edinburgh (United Kingdom) and prof. Bram Verschuere of the University of Gent (Belgium). We are very thankful for their contributions.
References

*in systematic review


The Guardian (2010) Cameron’s ‘big society’ is a town 14-04-2010 (http://www.guardian.co.uk/commentisfree/2010/apr/14/david-cameron-big-society-conservatives) last viewed 02-04-2013


*Weaver, B. (2011). Co-producing community justice: The transformative potential of personalisation


## Annex 1: PRISMA checklist

### Title

<table>
<thead>
<tr>
<th>Section/topic</th>
<th>#</th>
<th>Checklist item</th>
<th>Reported on page #</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>1</td>
<td>Identify the report as a systematic review, meta-analysis, or both.</td>
<td>1</td>
</tr>
<tr>
<td><strong>Abstract</strong></td>
<td></td>
<td></td>
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<tr>
<td>Structured summary</td>
<td>2</td>
<td>Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.</td>
<td>2</td>
</tr>
<tr>
<td><strong>Introduction</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Rationale</td>
<td>3</td>
<td>Describe the rationale for the review in the context of what is already known.</td>
<td>3</td>
</tr>
<tr>
<td>Objectives</td>
<td>4</td>
<td>Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).</td>
<td>5</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td></td>
<td></td>
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<tr>
<td>Protocol and registration</td>
<td>5</td>
<td>Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.</td>
<td>6</td>
</tr>
<tr>
<td>Eligibility criteria</td>
<td>6</td>
<td>Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.</td>
<td>6</td>
</tr>
<tr>
<td>Information sources</td>
<td>7</td>
<td>Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.</td>
<td>6, 7</td>
</tr>
<tr>
<td>Search</td>
<td>8</td>
<td>Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.</td>
<td>7</td>
</tr>
<tr>
<td>Study selection</td>
<td>9</td>
<td>State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).</td>
<td>7</td>
</tr>
<tr>
<td>Data collection process</td>
<td>10</td>
<td>Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.</td>
<td>7</td>
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<tr>
<td>Data items</td>
<td>11</td>
<td>List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Risk of bias in individual studies</td>
<td>12</td>
<td>Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Summary measures</td>
<td>13</td>
<td>State the principal summary measures (e.g., risk ratio, difference in means).</td>
<td>N.A.</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>14</td>
<td>Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., ( I^2 )) for each meta-analysis.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Section/topic</td>
<td>#</td>
<td>Checklist item</td>
<td>Reported on page #</td>
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<tr>
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<tr>
<td>Risk of bias across studies</td>
<td>15</td>
<td>Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).</td>
<td>6, 7</td>
</tr>
<tr>
<td>Additional analyses</td>
<td>16</td>
<td>Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.</td>
<td>7</td>
</tr>
<tr>
<td>RESULTS</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Study selection</td>
<td>17</td>
<td>Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.</td>
<td>8</td>
</tr>
<tr>
<td>Study characteristics</td>
<td>18</td>
<td>For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.</td>
<td>9</td>
</tr>
<tr>
<td>Risk of bias within studies</td>
<td>19</td>
<td>Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).</td>
<td>N.A.</td>
</tr>
<tr>
<td>Results of individual studies</td>
<td>20</td>
<td>For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>21</td>
<td>Present results of each meta-analysis done, including confidence intervals and measures of consistency.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Risk of bias across studies</td>
<td>22</td>
<td>Present results of any assessment of risk of bias across studies (see Item 15).</td>
<td>N.A.</td>
</tr>
<tr>
<td>Additional analysis</td>
<td>23</td>
<td>Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).</td>
<td>9-18</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td></td>
<td></td>
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<tr>
<td>Summary of evidence</td>
<td>24</td>
<td>Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).</td>
<td>18,19</td>
</tr>
<tr>
<td>Limitations</td>
<td>25</td>
<td>Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).</td>
<td>20</td>
</tr>
<tr>
<td>Conclusions</td>
<td>26</td>
<td>Provide a general interpretation of the results in the context of other evidence, and implications for future research.</td>
<td>20, 21</td>
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<tr>
<td>-------------</td>
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</tbody>
</table>

**FUNDING**

| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 1 |

Page 1 of 2


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