Use of research evidence in policymaking in three Danish municipalities

Jakobsen, Mette Winge; Lau, Cathrine Juel; Skovgaard, Thomas; Hämäläinen, Riitta-Maija; Aro, Arja R.

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This article analyses the use of research evidence (RE) in three policy processes, at the local level, dealing with physical activity. We analysed an extensive number of policy documents and a total of 14 interviews with policymakers. Results show an unsystematic way of using RE, where demographic and statistical data as well as expert consultation were mostly used. Lack of transparency of RE use complicated the tracking of sources from introduction to actual policy impact. It can be concluded that the policymakers engaged in health issues have a wider use of RE than the policymakers working with more sports-oriented issues.

**key words** evidence-informed policymaking • translation • utilisation • physical activity

**Introduction**

There is substantial evidence that regular physical activity is associated with numerous health benefits and the effective prevention of a number of lifestyle-related diseases (Das and Horton, 2012; Giles-Corti et al, 2016; Hallal et al, 2012; Kohl et al, 2012; Lee et al, 2012; Sallis et al, 2016; Stevenson et al, 2016; WHO, 2010; WHO Regional Office for Europe, 2006). However, local policymakers as well as the research community face several challenges in effectively integrating such evidence into policy and increasing
Researchers and policymakers stress the importance of designing cross-sectoral physical activity policies informed by the best available evidence, including research evidence (RE) (Bull et al, 2014; EU Working Group ‘Sport & Health’ 2008; Woods and Mutrie, 2012).

Research shows that the use of RE in public (health) policymaking depends on a variety of factors. From the researchers’ perspective, their ability to provide relevant and timely input and combine findings from various sectors and tailor them according to their relevance to policymaking through key messages are important facilitators of RE use (Zardo and Collie, 2015; Orton et al, 2011). Facilitators of RE use also include policymakers’ capacity to use research (Sa and Hamlin, 2015; Orton et al, 2011) and policymakers’ access to research (Bertram et al, 2016; Oh and Rich, 1996; Orton et al, 2011; Zardo and Collie, 2015; Sa and Hamlin, 2015). In addition, finding ‘common ground’ between researchers and policymakers through linkage mechanisms enhances research into policy (van der Arend, 2014), as do research-policy-practice interactions by incorporating lay perspectives in the translation of evidence from policy to practice, making RE relevant for practice (South and Cattan, 2014). On top of this, policymakers need to take other types of evidence into account, such as political values and priorities, the needs and preferences of the local community, resources and the engagement of different stakeholders (Bowen et al, 2009; Satterfield et al, 2009; van de Goor et al, 2017; Aro et al, 2015).

An evidence-informed public health (EIPH) approach has been promoted by the National Collaborating Centre for Methods and Tools in Canada. The aim of this approach was to move beyond evidence-based medicine and evidence-based public health to ensure effective public health policy and practice through well-founded policy decisions that take various types of evidence into account, not just research evidence (Ciliska et al, 2012). The EIPH approach promotes the integration of RE into the policymaking process through the systematic collection, assessment and synthesis of the best available empirical findings, and adapting them to local contexts, resources and needs (Ciliska et al, 2012; Graham et al, 2006; Bowen and Zwi, 2005).

However, this study uses a broader definition of RE than the EIPH approach, acknowledging that policy-relevant research information does not always come in the form of systematically collected empirical findings. We define RE as all kinds of research information that enter the policymaking sphere – including demographic and statistical baseline data, guidelines and recommendations, expert consultation, economic evaluations and case reports (Hämäläinen et al, 2015). This broad understanding of the concept RE allows us to detect all of the research that has entered the policymaking sphere and include this conglomerate in the following analyses.

To help us understand the process of using RE, we use a pathway described by Bowen and Zwi (2005) on evidence-informed policy and practice through three active stages of progression: (1) sourcing the evidence; (2) using the evidence; and (3) implementing the evidence. The theoretical understanding of research utilisation applied in this study stems from the work of Hanney et al (2003), which provides a framework for analysing research utilisation by reflecting on the research input and the context of decisions. To assess the context of decisions, Hanney et al (2003) provide different models and conceptualisations of research utilisation (based on the work of Weiss’ instrumental, conceptual and symbolic use of research (Weiss, 1979)).
Although research utilisation has been studied for many years, only few studies have systematically shed light on the explicit use of RE in public health policymaking, and to what degree RE is integrated into real life policymaking (Oliver et al, 2014; Zardo and Collie, 2015). Even fewer studies have examined the explicit use of RE in local physical activity policymaking (Aro et al, 2015). We aim to build on the existing research on barriers and facilitators of using RE (van de Goor et al, 2017) and contribute a more in-depth understanding of the practices and processes of research utilisation in specific public health policymaking settings. By gaining further understanding of the practices and processes of research in public health policymaking, we may help to improve the public health research system beyond Denmark. In Denmark, local governments are relatively autonomous authorities with elected councils in control of the local executive structure and with exclusive powers and an independent source of taxation. They are regulated by national authorities, for example, via national planning structures and policies on specific issues.

A major public sector reform in 2007 triggered an extensive reorganisation of municipalities’ structure and activities. To accommodate both the merging of municipalities and new areas of responsibility, health promotion and disease prevention such as physical activity became key issues for the local authorities (Sundhedsloven, 2010).

This study aims to analyse which types of explicit RE were used in the development of three local physical activity policies in Denmark, as well as the process and purpose of RE use.

Methods

The data was collected as part of REPOPA (REsearch into POlicy to enhance Physical Activity) (Aro et al, 2015), a cross-national project including six member states of the European Union (EU).

Selection of the case studies

In 2012, we conducted case studies of physical activity policymaking in three Danish municipalities. Physical activity policies were defined as formal statements by local governments that identify increasing population-level physical activity as a priority. The local policies had to describe the overall political ambitions, target groups and define the overall responsibilities for achieving the policy goals.

Four policies were selected based on the following criteria: (1) full policy adoption in 2011 and implementation in progress at the time of the study; (2) a focus on health-enhancing physical activity (that is, not merely competitive sports); and (3) implementation in a municipality with at least 75,000 inhabitants (hypothesising that larger municipalities have more potential to use RE). The selected cases fitting the criteria were placed in different geographical areas of the country, and they agreed to attend when researchers made contact. They agreed for thorough analyses of documents and interviews with relevant policymakers. The relations between researchers and municipalities were grouped into three types: (1) the researchers and the municipality were in the same geographical area; (2) the researcher had a personal work-related contact with the municipality; or (3) both (1) and (2). A full analysis of policies in Denmark was not completed before the selection of the cases.
In total, four municipalities, Copenhagen, Esbjerg, Frederiksberg, and Odense, were contacted. One municipality was not included because they were not able to meet our need for interviews with all relevant policymakers.

<table>
<thead>
<tr>
<th>Policy/case name</th>
<th>Copenhagen City’s Public Health Policy – long live Copenhagen / Case A</th>
<th>The Health Policy of Odense Municipality - Healthy Together / Case B</th>
<th>The Sports and Physical Activity Policy of Esbjerg Municipality / Case C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy owner</td>
<td>Health and Care Committee</td>
<td>City Council</td>
<td>Children and Culture Committee</td>
</tr>
<tr>
<td>Policy developer</td>
<td>Public Health Department, Health and Care Administration</td>
<td>Health Secretary, Mayor’s Administration</td>
<td>Culture and Development Department, Children and Culture Administration</td>
</tr>
<tr>
<td>Policy areas relevant for physical activity</td>
<td>The policy covered health in general. Physical activity was highly prioritised throughout all areas (more life – better city life, healthy and active everyday life, more equality in public health, better prevention and treatment)</td>
<td>The policy covered health in general. Physical activity was prioritised in four out of six areas (equality in health, strengthened effort towards chronic illnesses, healthy urban life and making the healthy choice the easy choice)</td>
<td>Six overall policy goals on physical environment, visibility, health promotion, non-élite sport, talent development, and élite sport</td>
</tr>
<tr>
<td>Size of municipality expressed in approximate number of inhabitants</td>
<td>470,000</td>
<td>195,000</td>
<td>115,000</td>
</tr>
<tr>
<td>Number of policy documents included</td>
<td>11</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Type of policy documents analysed</td>
<td>Main policy, political committee meeting programmes, memos, time schedules, public hearing material and the first annual status report of the policy</td>
<td>Main policy, terms of reference, meeting agendas and minutes, policy drafts, memos, filed correspondences, for example emails regarding invitations, draft comments, and so on, overall strategy of the Health Policy, time schedule, process plan, communication plan, stakeholder analysis, risk analysis, goals hierarchy, presentation material, press release, implementation plan</td>
<td>Main policy, terms of reference, meeting agendas and minutes (including stakeholder workshop programmes), time schedule, work plan, memos, stakeholder list, leaflet and presentation material, press releases, action plans (including drafts), public hearing material</td>
</tr>
<tr>
<td>Number of interviewees analysed</td>
<td>Five public officials from the Health and Care Administration</td>
<td>Six public officials from the Health Secretary, managed by the Elderly and Handicap Director</td>
<td>Three public officials from the Culture and Development Administration, and one public official from the Health and Prevention Administration</td>
</tr>
</tbody>
</table>
Data collection

The data set comprised policy documents, including the main policy document and background materials developed during the policymaking process, and transcriptions of interviews with policymakers, defined as public officials, since they have the largest role in integrating research into policy (Table 1). This data collection method is widely used to analyse research utilisation (Lavis et al, 2002; Hanney et al, 2003; Orton et al, 2011). The data was retrospectively collected and provided by municipal contacts. Since the policies were still being implemented during the data collection, we excluded the policy implementation and evaluation phases. However, to ensure that the policy objectives were equally detailed in all selected policies, we included the development of the implementation strategy of the Health Policy of Odense (Case B), and the development of the policy action plans of the Sports and Physical Activity Policy of Esbjerg (Case C), which were developed by the time of data collection.

For the interview phase, the policymaker with the most responsibility for developing the policy was initially asked to provide contact information on relevant informants to include in the study. We aimed at the public health professionals who worked on physical activity–related issues and those who had a major role in writing the policy. Second, through a snowballing method during the interview phase, more relevant informants were contacted and included in the study. In Case A, all identified individuals were interviewed. In Case B, we interviewed selected individuals involved in the policymaking process. In Case C, all identified individuals were interviewed.

Policy documents were collected and analysed between December 2011 and June 2012 as a part of a REPOPA sub-study. The findings from the document analysis were used to inform the interview guide (adjusted for each case) to ensure consistency with the policy documents and provide in-depth details on the issues identified in the documents.

Selected research questions, developed for the REPOPA sub-study, guided the document analysis, the interview guide and the subsequent analysis of the interview transcriptions. The questions relevant to the present study were related to the policy development process; the types of evidence, including RE, used; the organisational culture and processes / structures of RE use; the barriers to and facilitators of RE use; and the future needs of policymakers to promote the use of RE in policymaking (Aro et al, 2015).

Fourteen interviews were conducted in Denmark and in Danish by five researchers using a detailed, piloted and locally tailored interview guide based on the generic REPOPA interview guide (Hämäläinen et al, 2015). The pilot results, which were used only to develop the interview guide, indicated that the interviewers should allow for a broader conceptualisation of the term RE to capture all types of RE. This explains our broader definition of RE in the introduction.

All of the interviews were recorded and transcribed verbatim. The interviewees (Table 1) were policymakers who had played an important role in developing the policies.

Data analysis

Four researchers coded and analysed the policy documents and interviews using a qualitative content analysis with NVivo software.
Based on the detailed interview guide and the selected analytical frameworks, a comprehensive list of codes was developed prior to the coding of the interviews. Prior to and during the coding phase, the researchers discussed and shared their understanding and reflections of the codes and developed new codes if needed.

To code for the explicit use of RE during policymaking, we searched for references in the policy documents. We also looked for passages in the policy documents indicating the use of RE, which was used as a starting point during the interviews when asking about explicit sources of the RE used. After identifying as many sources of RE used as possible, we calculated the amount of RE used in each of the cases and compared these raw numbers.

For the categorisation of type of RE used, we included demographic and statistical baseline data, single studies (peer-reviewed articles), case/project reports, pre-processed literature, economic evaluations, expert consultations and other types of RE such as international strategies. Pre-processed evidence was defined as RE derived from a systematic process of searching, appraising and synthesising the scientific literature (systematic reviews) and developing evidence-based guidelines, recommendations and evidence briefs (Brownson et al, 2009; Ciliska et al, 2012).

To analyse the process of RE use, we looked at what occurred when the RE was sourced (framing the question, need assessment of RE, collection process, and so on), interpreted (quality and feasibility assessment, appropriateness, applicability, and so on), and applied (political acceptance, economic feasibility, prioritisation of evidence, level of trust in the evidence, and so on) (Bowen and Zwi, 2005; Ciliska et al, 2012). The process of policymaking was divided into the following stages: agenda setting, policy formulation, policy implementation, and policy evaluation (Walt, 1996).

To guide the analysis of the purpose of RE use, we developed the following questions (based on the work of Hanney et al (2003)): (1) Was the RE used explicitly for technical purposes aiming to increase understanding of a problem, for example, for selecting the target population (conceptual modelling)? (2) Was the RE used instrumentally to make informed choices based on robust empirical findings (data-based policy)? (3) Was the RE used only partially to protect the political realm (constrained modelling)? (4) Was the RE used to allow researchers to influence policy as one of many stakeholders through a strictly controlled policy process (strategic research)? (5) Was the RE used to create goodwill within the public by openly / strategically supporting research (symbolic payback)? (6) Was the RE used simply to support policy decisions based on other evidence other than RE (symbolic argumentation)? (7) Was the RE used implicitly to influence the policy paradigm, which was then reflected in the policy (paradigms)? (8) Was the RE used by policymakers as a way to stay informed about the person’s area of expertise (policymakers’ practice wisdom)?

Results

The analysed policies were owned by different sectors: one by the health sector, one by the culture sector, and one managed jointly by all sectors (city council) (Table 1). However, it should be noted that the policies of Cases A and B are related to public health, whereas the policy of Case C is related to sports. In addition, it was primarily public health professionals that were involved in the development of the policies in Cases A and B, and no public health professionals were involved in the Case C policy.
Both the policy documents and the interviews revealed that explicit RE was used in all cases (Table 2). The policymakers in Cases A and B used the same amount of RE, whereas the policymakers in Case C used only one-third of that amount. The results show a clear difference of RE use between the public health policy area and the sports policy area.

**Type of RE used in the three cases**

This section includes findings on the types of RE used for the development of the three policies. The main types of RE used include demographic and statistical data, evidence-based guidelines and recommendations, single studies, case and project reports, and expert consultations.

Demographic and statistical data (for example, regional and local health and physical activity profiles) accounted for the majority of the RE used in Cases A and B (Chart 1), which included regional and local health and physical activity profiles, some for specific population groups.

In Case C, a fact sheet on exercise and physical activity trends in the Danish population was used. Special data and statistics (for example, extra analysis of the health profile data) were also used in Case A.
<table>
<thead>
<tr>
<th>Research evidence type</th>
<th>Copenhagen City’s Public Health Policy – long live Copenhagen / Case A</th>
<th>The Health Policy of Odense Municipality – Healthy Together / Case B</th>
<th>The Sports and Physical Activity Policy of Esbjerg Municipality / Case C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic and statistical baseline data (facts and reports, which report facts and tendencies in health and physical activity)</td>
<td>Statistical facts about cyclists. Copenhagen Municipality Facility statistics from the facility database by The Danish Foundation for Culture and Sports Facilities, 2007–2008</td>
<td>Statistics about the elderly population in Odense Municipality, drawn from Statistics Denmark</td>
<td>Internally collected numbers of young residents in the municipality</td>
</tr>
<tr>
<td>Single studies (peer-reviewed empirical findings)</td>
<td>Andersen, LB, Schnohr, P, Schroll M, Hein, HO. All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. Archives of Internal Medicine, 2000,160,1621–8 (Results from Copenhagen Heart Study)</td>
<td>Peer-reviewed articles from Canada (specific references not provided)</td>
<td></td>
</tr>
<tr>
<td>Research evidence type</td>
<td>Copenhagen City’s Public Health Policy – long live Copenhagen / Case A</td>
<td>The Health Policy of Odense Municipality – Healthy Together / Case B</td>
<td>The Sports and Physical Activity Policy of Esbjerg Municipality / Case C</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
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<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Case and project reports</td>
<td>Results from a national study about inactive adults conducted by Krustrup, P, University of Copenhagen (no clear reference has been provided)</td>
<td>Case report from Copenhagen Municipality on municipal savings (specific references not provided)</td>
<td>Information (type unspecified) on the project 'Sport to go' coordinated by Aalborg Municipality and Danish Gymnastic and Sports Association (DGI) Website information about the project 'A Good Detour', funded by the Real Dania Foundation</td>
</tr>
<tr>
<td>Pre-processed evidence (studies and literature derived from a systematic literature search in databases, appraised, synthesised and contextualised to specific policy issue and context such as systematic reviews, standards and guidelines, evidence briefs / summaries)</td>
<td>Physical activity and the environment, National Institute for Health and Clinical Excellence (NICE), 2008 We can live longer and healthier. The Commission of Prevention’s recommendations for a strengthened preventive effort, The Danish Ministry of Health, 2009 The Danish Public Health Report 2007, National Institute of Public Health, University of Southern Denmark The Health Profile for Region and Municipalities of Denmark, 2010, Capital Region of Denmark (It is not clear if the suggestions in the report have been used)</td>
<td>Physical activity – Handbook on prevention and treatment, Danish Health and Medicines Authority, 2011 We can live longer and healthier. The Commission of Prevention’s recommendations for a strengthened preventive effort, Danish Ministry of Health, 2009 White paper: Together for health: A strategy for EU 2008–2013, European Commission, 2007 Closing the gap in a generation, Commission on Social Determinants for health, World Health Organization, 2008 The Prevention Package, Danish Health and Medicines Authority, 2012 (draft version)</td>
<td>Evidence briefs by Danish Healthy Cities Network on the relationship between social and urban factors and health (specific references not provided)</td>
</tr>
<tr>
<td>Economic evaluations</td>
<td></td>
<td>Internal economic cost-effectiveness calculations</td>
<td></td>
</tr>
<tr>
<td>Research evidence type</td>
<td>Copenhagen City’s Public Health Policy – long live Copenhagen / Case A</td>
<td>The Health Policy of Odense Municipality – Healthy Together / Case B</td>
<td>The Sports and Physical Activity Policy of Esbjerg Municipality / Case C</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>Expert consultation (researchers and practice-based experts providing research-based knowledge)</td>
<td>Researcher from University of Copenhagen, Institute of Public Health Researcher from Royal Danish Academy of Fine Arts, School of Architecture Researcher from National Institute of Public Health, University of Southern Denmark Researcher from Research Centre for Prevention and Health, Capital Region of Denmark Public officials from Odense Municipality</td>
<td>Researcher from Department of Health Promotion and Prevention, National Institute of Public Health, University of Southern Denmark Researcher from Institute of Health Economics, University of Southern Denmark Hearing answer from two departments of University of Southern Denmark (Economics and sports) Danish Healthy Cities Network chairman and Health director from X Municipality Public official (lead consultant) from Copenhagen Municipality</td>
<td>Researcher from Danish Institute for Sports Studies Researcher from Institute of Sports and Biomechanics, University of Southern Denmark</td>
</tr>
<tr>
<td>Other (for example, international strategies targeting physical activity)</td>
<td></td>
<td></td>
<td>Reports by the Healthy Cities Network, for example, Phase V (2009–2013) of the WHO European Healthy Cities Network – Goals and Requirements, 2009 (Published in Danish in 2010)</td>
</tr>
</tbody>
</table>
Pre-processed evidence was mostly used in Cases A and B. Here, the early drafts were primarily based on evidence-based national and international guidelines and recommendations on the importance of physical activity for health and suggestions for physical activity policy and practice. It is unclear whether physical activity recommendations were used in Case C. Systematic reviews published in scientific journals were not used. Instead, evidence-based guidelines and recommendations from national and international authorities (for example, the Danish Health and Medicines Authority, WHO, and the National Institute of Clinical Excellence (NICE)) were used. Single studies and case/project reports were used in all cases, whereas only Cases A and B used peer-reviewed articles. Experts, including researchers, were involved in the policymaking process in all cases. Knowledge exchange between policymakers (peers) from Cases A and B was identified on two occasions. Regarding the knowledge sharing among peers and the case / project reports, experiences primarily came from larger cities.

**The process of RE use**

In this section, we will present findings on how policymakers sourced and assessed the RE. Overall, the findings show an unsystematic approach to sourcing the RE and, in relation to the assessment of the RE, more emphasis was placed on the local feasibility and applicability of the RE than the scientific quality of the RE.

The RE in Cases A, B, or C was not derived through a systematic search, review and synthesis process performed by the policymakers themselves. Instead, they adopted a more pragmatic approach, using easily accessible literature, such as guidelines and pre-processed evidence, or expert input.

The search for RE was initiated by policy-oriented questions and guided by the policymakers’ know-how.

A public official from Case B stated that there was no real literature search that occurred but that they looked for relevant research information on the websites of various Danish institutions (the Danish Health and Medicines Authority, universities, research centres), which they already knew about. References in the existing literature guided their further sourcing of research information. This public official used the analogy “like rings in the water” to describe her search strategy.

A policymaker in Case A used the analogy “like patchwork” about the knowledge building process, where RE evidence is not deliberately sourced but is received through newsletters and journals which is then included in the person’s knowledge pool by which policy documents are produced. Another policymaker from Case A stated that the problem with systematic literature searches is that it costs time and money and requires decision-making forces in places that currently are not geared for making such decisions.

In Case C, only RE available in the Danish language was used. The policymakers in Case C initially searched for RE via the websites of the Danish Institute for Sports Studies (inspired by the institute’s newsletter). Google was used as the primary search engine to search for additional RE, which directed one policymaker to the Danish Healthy Cities website and some architect websites. Primary data collection was mainly conducted in Case A, which regularly publishes statistics and research-based reports on various topics through its website. However, Case B also collected its own demographic data on school children and health.
In the RE search and collection process, finding sufficient RE to support the political goals was difficult because the goals were quite broad. The public officials thus demanded that policy evaluation reports provide more documentation to enable the proper assessment of the RE. One public official expressed the following:

… it is not my impression, when I search for Danish articles, that we have a particularly good tradition of documenting what we did. We evaluate, and we have a really fine moral in terms of evaluation designs in Denmark… and we are clear on what we evaluate upon… in municipalities focus is currently on effect on policy goals and that kind of thing, but how we did it, what is real, there is just not a tradition for that being the focus.

Although all policymakers welcomed easily accessible pre-processed evidence that was developed by the national authorities, some doubted the local feasibility of the evidence-based guidelines. A policymaker in Case B expressed the need for high-quality, multidisciplinary RE that considers the local context and allows for direct application by local policymakers. A policymaker expressed that the presentation of the RE was too clinical.

In all cases, great trust was afforded to the pre-processed evidence provided within guidelines and recommendations from national and international governmental bodies. One public official from Case B stated the following:

As an example, I use the National Health and Medicines Authority a lot in the area I work…. Then, I expect that when they send things out, then there is evidence for them.

Trust in the quality of evidence was also placed in individual studies and reports, as the following quote from Case C reveals:

… the ‘sport to go’ concept, for instance, those who have developed the concept itself, they have definitely, I think, used research evidence… or else they would not have any background for realising such a project.

Overall, during the assessment of pre-processed and other types of RE, greater emphasis was placed on the contextual feasibility than on the scientific quality of the RE.

In Case A, the collected RE was prioritised based on which risk factors including physical activity had the greatest impact on the policy goals and what was possible at that point in time. Unfortunately, we did not have sufficient information to analyse how the RE was prioritised in Case B, and we only know that RE was discarded in Case C if stakeholders did not approve of it.

**Purpose of RE use**

The following section includes findings on when and for what purpose the different types of RE were used. We were not able to track each source of RE from its introduction to application / implementation. We identified the use of the different types of RE in the agenda-setting phase and in the policy formulation phase. We
Use of research evidence in policymaking in three Danish municipalities

Table 3 Purpose of using RE in three Danish cases of local physical activity policymaking

<table>
<thead>
<tr>
<th>Research evidence type</th>
<th>Process of policymaking</th>
<th>Case</th>
<th>Purpose of RE use</th>
<th>Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic and statistical baseline data</td>
<td>Agenda setting</td>
<td>A,B,C</td>
<td>Conceptual modelling</td>
<td>A,B,C</td>
</tr>
<tr>
<td></td>
<td>Policy formulation</td>
<td>A,B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single studies</td>
<td></td>
<td></td>
<td>Data-based policy</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conceptual modelling</td>
<td>B</td>
</tr>
<tr>
<td>Case and project reporting</td>
<td>Agenda setting</td>
<td>B</td>
<td>Data-based policy</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Policy formulation</td>
<td>C</td>
<td>Practice of wisdom</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Unspecific</td>
<td>A,B</td>
<td>Unspecific</td>
<td>C</td>
</tr>
<tr>
<td>Pre-processed evidence</td>
<td>Agenda setting</td>
<td>A,B,C</td>
<td>Data-based policy</td>
<td>A,B</td>
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<tr>
<td></td>
<td>Policy formulation</td>
<td>A,B</td>
<td>Conceptual modelling</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Unspecific</td>
<td></td>
<td>Symbolic argumentation</td>
<td></td>
</tr>
<tr>
<td>Economic evaluations</td>
<td>Policy formulation</td>
<td>B</td>
<td>Data-based policy</td>
<td>B</td>
</tr>
<tr>
<td>Expert consultation</td>
<td>Agenda setting</td>
<td>A,B,C</td>
<td>Data-based policy</td>
<td>A,B</td>
</tr>
<tr>
<td></td>
<td>Policy formulation</td>
<td>A,B</td>
<td>Symbolic argumentation</td>
<td>A,B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strategic research</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conceptual modelling</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Practice of wisdom</td>
<td>A,B</td>
</tr>
<tr>
<td>Other</td>
<td>Agenda setting</td>
<td>B</td>
<td>Conceptual modelling</td>
<td>B</td>
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1 A=Case A, Copenhagen City’s Public Health Policy – long live Copenhagen, B=Case B, Health Policy of Odense Municipality – Healthy Together, C=Case C, Sports and Physical Activity Policy of Esbjerg Municipality

found that demographic and statistical data was used to identify target groups and to frame the policies (conceptual modelling). Evidence-based guidelines and recommendations were used conceptually in the agenda-setting phase (conceptual modelling), instrumentally to select policy actions (data-based policy), and as symbolic argumentation in the policy formulation phase. Single studies were used both instrumentally and conceptually. Case and project reports were used instrumentally and to stay informed about a particular area of expertise (policymakers’ practice wisdom). Practice-based expert consultation was also used to increase policymakers’ practice wisdom. Expert consultation including consultations by researchers was used to develop policy actions (data-based policy), symbolically to legitimise policy actions, and strategically as a political power demonstration by the politicians.

In addition, we also included detailed information about the individual sources of RE, which we were able to track.

The use of demographic and statistical baseline data was popular in the early policymaking phases to provide knowledge about the health and demographical status of the target population (Table 3). This information was used to identify areas of risk and opportunities for physical activity, and to identify and understand the target population. Demographic and statistical baseline data was purely used to frame the policy (conceptual modelling). Cases A and B presented some of these data in the final policy.

The pre-processed evidence, such as evidence-based guidelines and recommendations, was used in the agenda-setting phase (Cases A and B) to frame the policy; for example, to understand the target population (conceptual modelling), and in the policy formulation phase both to develop policy goals and actions supported by RE (data-based policy), and to legitimise the policy goals and actions (symbolic argumentation).
Single studies were used in two cases. In Case A, a peer-reviewed article was used to explore the possibility of preventing early mortality through physical activity (data-based policy). In Case B, peer-reviewed articles from Canada were used to establish best practices related to health in all policies (conceptual modelling); however, references or information on the topics of the Canadian articles were not provided.

Case studies and project reports were used as inspiration in all of the cases. In Case A, an evaluation report on an intervention targeting inactive adults was used (data-based policy). Policymakers in Case B used a report from Copenhagen Municipality combined with expert consultation for benchmarking (practice of wisdom). There might have been further use of this source but it was not identified. In Case C, project material was used in the policy formulation phase; however, the specific use was unspecified.

Knowledge exchange between policymakers from Cases A and B was identified on two occasions. In Case B, the municipal Director preferred to focus on co-financing local services, of which Copenhagen Municipality had published the previously mentioned report. Therefore, the policymakers in Case B contacted the public official leading this work for practice-based knowledge sharing (practice of wisdom). In Case A, policymakers were interested in the experiences Odense Municipality had gained from being a bicycling city (practice of wisdom).

In general, RE was used in Case A to assess the impact of policy goals on life years and years of poor health (data-based policy).

In addition, RE was used in several cases in Case B to assess the cost-effectiveness of target areas (data-based policy); however, a public official stated that the politicians handpicked the data and recommendations, which fitted their purposes and disregarded the assumptions underlying the recommendations.

Experts were involved during the problem identification phase in all cases. In Case A, various experts and researchers provided input on the most relevant public health topics, including physical activity, based on RE (data-based policy); however, in some cases, the information provided by the researchers and experts were used to legitimise the policy (symbolic argumentation).

In Case B, one expert and two researchers provided input on the greatest economic challenges in health. Here, emphases were on health inequalities, lifestyle factors including physical activity and sedentary lifestyles, and practice-based experiences from the Danish Healthy Cities Network. In this case, the politicians requested the involvement of external experts as a way to take back the decision-making power. In their opinion, the first policy draft had already been developed by the public officials without sufficiently involving the politicians. Thus, the politicians requested that RE supporting the policy be presented to them. The public officials invited two researchers and one expert to a meeting with the politicians to present RE on the greatest economic challenges in health (strategic research), and one of the researchers thereafter contributed with research information during the policy formulation phase (data-based policy). Although the public officials expressed their positive experience and gratitude for this involvement, the second policy draft did not change considerably, which could indicate a more symbolic use of RE (symbolic argumentation).

In Case C, a researcher from the Danish Institute for Sports Studies provided input in the agenda-setting phase on the policy approach and proposed a new way of defining target groups based on the life-cycle perspective (conceptual modelling). However,
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despite the support from the policy developer, this perspective was discarded due to a lack of acceptance by the stakeholders.

Late in the policy formulation phase of Cases A and C, researchers also provided input on the development of more detailed policy actions (data-based policy).

To summarise, data-based policymaking was the most common way of using RE; however, RE was also often used to frame the policy (conceptual modelling). Although Case A most often took a data-based approach, the policymakers also used RE in various other ways (conceptually, symbolically, implicitly), as was done in Case B. When looking purely at the different purposes of RE, the two cases differed only in the fixed window of opportunity in the policy formulation phase created in Case B by the politicians, allowing two researchers and one expert to influence the otherwise very closed policymaking process.

Discussion

According to the Danish Health and Medicines Authority, local governments in Denmark are committed to assessing public health problems, collaborating across sectors, and developing and implementing policies based on evidence to counter public health problems, but are challenged by the use of RE in policymaking (Sundhedsstyrelsen, 2008).

We identified several sources of RE during the analysis of policy documents and interview data. Our findings show, in line with the above, that the policymakers in our study were focused on RE and interested in using RE in policymaking, not just symbolically but also instrumentally. We also identified several gaps and possibilities for improvements in the process of using RE in local physical activity policy. Our results point to the lack of transparency of RE use by policymakers, a prerequisite for establishing a causal relationship between policy actions and possible policy outcomes, which is an issue of importance not only for research purposes but also to the justification and accountability of the policy. Transparency of RE use was the greatest in Case A.

Our findings show a clear difference between the sources of RE and the amount of RE used between Cases A, B, and C. This indicates differences in capacity and research utilisation procedures between policy areas. The policymakers in Cases A and B have training and experience in the public health discipline, many with specialised knowledge in public health and health-enhancing physical activity, whereas the policymakers in Case C have a background in disciplines such as culture and sports, or are generalists. Since the EIPH approach stems from the public health field, people employed in this policy area may be more qualified and trained to work evidence-informed. Although we have not studied more than two different policy areas, our results identify a potential for enhancing EIPH policymaking by increasing intersectoral collaboration. Our findings may also indicate the importance of individual policymakers for diffusing the RE from sourcing to application. Castellani et al (2016) identified the use of RE in meta-policies and the importance of ‘pivot’ (key) people in developing evidence-informed policies.

Our findings indicate that, for at least one of our policymaking settings analysed (Case B), the system is not geared for conducting their own systematic reviews. Although neither Cases A or B, nor C, conducted their own systematic review, this may also be the situation in other settings.
Type of RE used

The large amount of demographic and statistical baseline data used in Cases A, B, and C supports a context-focused approach towards integrating RE into policy. This tendency partially complies with the general description that health promotion interventions ‘should be’ ‘context-dependent or context-focused’ (Aro et al, 2008, 549). However, in the three cases (primarily in Cases B and C), RE on what works in a particular setting was seldom used (context-dependent). Instead, RE on what is the problem in a particular setting was used to frame the policy and the policy actions (context-focused). This result points to the difference between policymaking and policy implementation. In local policymaking, the policies are approved by politically elected representatives where policy actions and goals might be in conflict with needed resources and available knowledge. By developing more detailed policies including detailed policy actions, as was done in Case A, policymakers would ensure better implementation of policies through realistic resource allocation and accountability, particularly in policies concerning intersectoral actions for health.

The primary use of demographic and statistical baseline data for contextual purposes is supported by a previous study on the use of RE in various public health interventions conducted in Danish municipalities (Bertram et al, 2016; Larsen et al, 2012). These studies revealed that data on demographic and population characteristics were used in all types of interventions, and systematic reviews were used only in health protection interventions. This tendency implies the need for more context-dependent evidence on what works in particular settings for developing health promotion interventions.

We also found in our study that systematic reviews were used only if they were presented in other sources, such as evidence-based guidelines and recommendations. This points to the importance of channels through which research evidence is disseminated to policymakers, such as evidence-based guidelines and trusted Internet sites.

Our findings show that external experts, including researchers, were involved in the policymaking process, primarily in its early phases. Other studies have shown this collaboration to be effective to promote RE use (Walter et al, 2003; Frank et al, 2012; Lomas, 2007). In Case B, an in-depth analysis of the use of external stakeholders, such as researchers and experts, shows that the politicians have a great influence on collaboration with the external experts, creating a window of opportunity in an otherwise closed policymaking process (Eklund Karlsson et al, 2016). Previous research has shown that formal collaboration between researchers and policymakers is lacking (Orton et al, 2011) and that this was also the case in Denmark in 2008 (Sundhedsstyrelsen, 2008). However, an important contribution of our study is to highlight the changes at the local government level in relation to the involvement of external experts such as researchers to support evidence-informed policymaking (Haynes et al, 2011a).

Process of RE use

Our findings on the sourcing and assessment of RE showed that a pragmatic and unsystematic approach towards the use of RE was taken, in which easily accessible literature primarily in Danish, as well as in a few cases in English, was preferred. The
local and political applicability of RE, rather than its scientific validity and reliability, were the main criteria for using RE.

Our respondents expressed the need for pre-processed evidence and guidelines on local public health policymaking to provide more details to allow for the application of RE in local contexts.

Our findings show that RE should support the development of effective and context-specific policy goals, objectives and actions, which is applicable to local physical activity policymaking. The policymakers noted that access to usable RE for developing overall policy goals was generally lacking. Although national authorities and research institutions focus on supporting local policymakers with easy access and usable RE in public health, our study shows that a large gap remains between the available RE and its use in physical activity policymaking, particularly since overall policy goals outline the premises for policy implementation. The REPOPA sub-study, which involved analyses of policies from different policymaking levels (national, regional, local) including our three Danish cases, also showed the need for more applicable RE that relates to the context of the population and the context of policymaking (Hämäläinen et al., 2013). Applying a realist approach to the synthesis and evaluation of public health policies and interventions would allow for more in-depth knowledge of the context, mechanisms and outcomes of policy actions and interventions (Pawson et al., 2005; Pawson and Tilley, 1997).

Practical constraints, such as insufficient time and skills in assessing and applying the most relevant RE, have also been recognised in other studies as barriers to integrating RE into public health policy and practice, both in Denmark and internationally (Bertram et al., 2016; Larsen, 2013; Orton et al., 2011; van de Goor et al., 2017), emphasising the need to support policymakers with research capacity building and critical assessment of the local applicability of RE (for example, via policy tools such health impact assessments) (Brownson et al., 2009).

**Purpose of RE use**

Although a data-based approach was primarily used, our findings indicate that the more policymakers use RE, the more varied the purpose of its use. Unfortunately, we were only able to track some of the demographic and statistical data to the final policies in Cases A and B. This result highlights the relationship between increased research use and the variety of use, where policymakers not only use research to make evidence-based policies but also become more creative in the use of RE to support policy.

By tracking the RE used in Case C, we conclude that although RE was used for the purpose of developing data-based policies, the RE can fail to create an impact if rejected by other evidence such as stakeholder preferences. Whether this policy was worse off because of a lack of RE is uncertain since stakeholder preferences was a main premise underlying the policy. However, the competition between RE and other kinds of evidence is supported by an earlier paper from the REPOPA study with data from six EU member countries (Hämäläinen et al., 2015).

Using the categorisation of the purpose of using RE developed by Hanney et al. (2003) proved to be more challenging than first anticipated. For instance, it was difficult for us to characterise the purpose of using an evaluation report in case A as data-based. This evaluation report was not seen as strongly empirical, and the principle
behind a data-based approach is that the strength of the evidence is the leading cause of action. However, the purpose of the policymakers in Case A was to make an informed decision about a policy action in regard to its effectiveness, which we believe lies within the data-based policy approach. Nonetheless, what we believe is lacking in the categorisation by Hanney et al is a problem-driven approach, which had already been formulated by Weiss (1979), where policymakers have a particular problem to solve, not just conceptually, and need to find RE to solve that problem. So the problem itself is the leading cause of action. In this case RE is only used to guide an action, which would have occurred either with or without RE.

**Target audience for RE in local physical activity policymaking**

Our findings indicate that the two evidence-based guidelines (The Prevention Package on Physical Activity and the Handbook for Physical Activity), both published by the Danish Health and Medicines Authority (Sundhedsstyrelsen, 2011; 2012), affected policymaking in Cases A and C. These guidelines were useful for the health sector; however, according to our study, they were not used by the sports sector. Instead, guidelines from the Danish Healthy Cities Network, which targets all sectors, were used. National authorities targeting local public health professionals (such as the Danish Health and Medicines Authority and Local Governments Denmark) are supporting local policymakers in working evidence-informed through guidelines on using RE in local public health policymaking (Kommunernes Landsforening, 2008; Sundhedsstyrelsen, 2007) and evidence-based guidelines and recommendations for public health interventions. However, since evidence-informed public health policymaking should be a skill utilised not only by public health professionals but also by all professionals working with policies that have an impact on health, there is a need for cross- and intersectoral collaborations on health at all policymaking levels (Aro et al, 2015).

**Study strengths and limitations**

The traditional way of writing policies without references presents a challenge for assessing the explicit use of RE as well as the impact of RE in policy documents. By combining analyses of policy documents with in-depth interviews, we were able to track most of the RE used from the introduction to the use of RE in policymaking. Despite our efforts, we may have overlooked information due to the lack of references in the policy documents and to recall bias of the interviewees, such as the lack of specificity when questioning each source of RE and its retrieval, and use in policymaking. Additionally, due to time and other resources, we could interview only some of the individuals involved in the policymaking processes. Interviewing only some of the relevant policymakers (relevant = involved in the development of the policy document) may result in over- or under-reporting the use of RE. Over-reporting may be a result in those cases where those who were interviewed are those who were the most likely to use RE in their daily policy development work. This may typically be policymakers with academic competences, particularly if they have a background in public health (Cases A and B). Conversely, under-reporting may occur in those cases where those who were interviewed are those who were the least likely use RE in their daily policy development work.
In Case A, we interviewed all those involved in the development process of the policy document; hence, from this municipality, we expect no bias. The procedure was the same in Case C. In Case B, we interviewed only some of the individuals who were involved in the policymaking process. This selection could result in an under-reporting of RE use in this case. However, we aimed at the public health professionals who worked on physical activity-related issues and those who had major tasks in writing the policy.

We believe that the strength of the present study is that it provides in-depth information about three aspects of RE use in three local physical activity policymaking settings: the explicit RE used, the process of RE use, and the purpose of RE use in real life policymaking.

Conclusions

Our findings show that RE was used in the development of three local physical activity policies; however, there was a marked difference between the two cases from the public health policy area and the case from the sports policy area. When sourcing the RE, the policymakers applied a pragmatic and unsystematic approach. Policymakers were more critical towards the direct application of RE to the local context than towards the scientific quality of the RE, placing great trust on the RE provider.

Great emphasis was placed on demographic and statistical baseline data during the early policymaking phases, indicating that contextual knowledge is important to frame the policy. Our study supports previous findings showing the importance of pre-processed evidence, including guidelines, for local policymakers and the applicability of expert input in providing context-focused RE.

Our findings show that RE is used in various ways, and the more RE is used, the more widely it is used by the policymakers. We are also able to conclude that although the RE was used instrumentally (data-based policy), it does not ensure its application if conquered by other types of evidence such as stakeholder preferences.

Our results point to the need to develop and synthesise more RE applicable to local public health policymaking, and to use science communication channels that fit to the need of policymakers. Researchers should also support policymakers with research capacity building and the critical assessment of RE. Another contribution of this study is the importance of transparency of RE use in policymaking. This means that more emphasis should be placed on referencing RE in policy documents. Transparency also includes more clarity on the causal relationships between policy goals, policy actions, and policy implementation to achieve optimal health gains in the population. We would also like to stress the positive influence of expert consultations and cross- and intersectoral collaborations when developing EIPH policies.

We believe that more research on the use and role of RE in specific policymaking and institutional contexts is needed to better support evidence-informed policymaking.

Authors’ contributions

All authors contributed to the development of the study. MWJ and CJL were the principal investigators of the case studies, and they received guidance from R-MH and TS. MWJ wrote the manuscript draft; in addition, important contributions to the structure and content of the manuscript were made by ARA, CJL, R-MH and TS. All of the listed authors have accepted the final version of the manuscript.
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