Towards large-scale adaptation and tailored implementation of evidence-based primary cancer prevention programmes in Europe and beyond (PIECES)

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1. Update of methodology of PIECES-EBPCPP Repository based on selection of interventions from the NCI-EBCCP website

The National Cancer Institute (NCI) Evidence-Based Cancer Control Programs (EBCCP) website is a searchable database offering easy access to materials that public health practitioners and others can use to implement cancer control interventions in clinical settings or communities. Link to the website is here: https://ebccp.cancercontrol.cancer.gov/index.do

We considered the following interventions from NCI repository:

- Diet-nutrition: 46 interventions
- HPV vaccination: 6 interventions
- Obesity: 29 interventions
- Physical activity (PA): 41 interventions
- Sun safety: 19 interventions
- Tobacco control: 30 interventions

So 171 interventions totally. Removing 42 duplicates (for diet-nutriton/PA/obesity program areas), 129 interventions remained.

To check whether these interventions were already reported in the PIECES taxonomy structure, we compared “Name of intervention” vs “Program Title & Description”. Only one intervention resulted in common: COPE (Creating Opportunities for Personal Empowerment) Healthy Lifestyles TEEN (Thinking, Emotions, Exercise and Nutrition)- Physical activity Program Area (https://ebccp.cancercontrol.cancer.gov/programDetails.do?programId=22686590).

Removing it, 128 interventions from the NCI Repository remained.

The inclusion criteria in the NCI site were in line with PIECES inclusion criteria for the other parts (Cochrane Reviews; implementation sites). Specifically, programs must meet the following criteria to be eligible for an EBCCP review on NCI site:

- Outcome finding(s) must be published in a peer-reviewed journal.
- The study must have produced one or more positive behavioral and/or psychosocial outcomes ($p \leq .05$) among individuals, communities, or populations.
- Evidence of these outcomes must be demonstrated in at least one study using an

experimental or quasi-experimental design. Experimental designs require random assignment, a control or comparison group, and pre- and post- assessments. Quasi-experimental designs do not require random assignment but do require a comparison or control group and pre- and post- assessments. Studies that are based on single-group, pre-/post-test designs do not meet this requirement.

- The program must have messages, materials, and/or other components in English that can be disseminated in a U.S. community or clinical setting.
- The program must have been evaluated within the past 10 years.

Following PIECES' inclusion criteria, we removed according to the item "Population focus" specific population groups such as Faith-based Groups, Adults with osteoarthritis, Medically Underserved and Athletes, for which a population intervention could not be applied. Therefore, we removed 9 interventions and 119 interventions remained (see "Complete" paper in Excel for the whole list).

As regard qualitative evaluation of interventions, the programs and their materials were evaluated in four areas:

1) Research Integrity

Research Integrity reflects the overall confidence reviewers can place in the findings of a program's evaluation based on its scientific rigor. The Research Integrity rating system comprises 16 criteria scored by independent experts. Scores on each criterion are given on a 5-point scale ranging from low quality to high quality. The overall integrity score is an average of the 16 criteria reflecting the merits of the science that went into the program evaluation.

2) Intervention Impact

Intervention Impact describes whether, and to what degree, a program is usable and appropriate for widespread application and dissemination. This rating is determined by the RC. Population Reach and Effect Sizes are separately rated on a 5-point scale; these ratings are then combined using the EBCCP Intervention Impact rating table to determine the impact score.

3) Dissemination Capability

Dissemination Capability refers to the readiness of program materials for use by others as well as a program's capability to offer services and resources to facilitate dissemination. The rating is given on

a 5-point scale ranging from low quality (1.0) to high quality (5.0). Dissemination capability is measured through the assessment of three areas:

- Quality of implementation materials
- Training and technical assistance protocols
- Availability of quality assurance materials to determine whether implementation was done with high fidelity to the original model

In addition, all the interventions were evaluated through the RE-AIM score, a five-step framework designed to enhance the quality, speed, and public health impact of efforts to translate research into practice. The RE-AIM scoring instrument consists of 22 items within 4 dimensions:

- Reach (5 items)

  Reach refers to the absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative, intervention, or program.

- Effectiveness (3 items)

  Effectiveness refers to the impact of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes.

- Adoption (6 items)

  Adoption refers to the absolute number, proportion, and representativeness of settings and intervention agents (people who deliver the program) who are willing to initiate a program.

- Implementation (8 items)

  At the setting level, implementation refers to the intervention agents' fidelity to the various elements of an intervention's protocol, including consistency of delivery as intended and the time and cost of the intervention. At the individual level, implementation refers to clients' use of the intervention strategies.

Additional information about RE-AIM can be found at http://re-aim.org.

Since the RE-AIM score is not currently assessed by EBCCP but by a group of external experienced researchers through an integrated and structured framework, it was considered as more reliable in

order to select the best interventions in terms of:

- Reaching your intended target population;
- Effectiveness or efficacy;
- Adoption by target staff, settings, or institutions;
- Implementation consistency, costs, and adaptations made during delivery;
- Maintenance of intervention effects in individuals and settings over time.

For this reason, from the complete list of interventions we selected those with the following cut-offs:

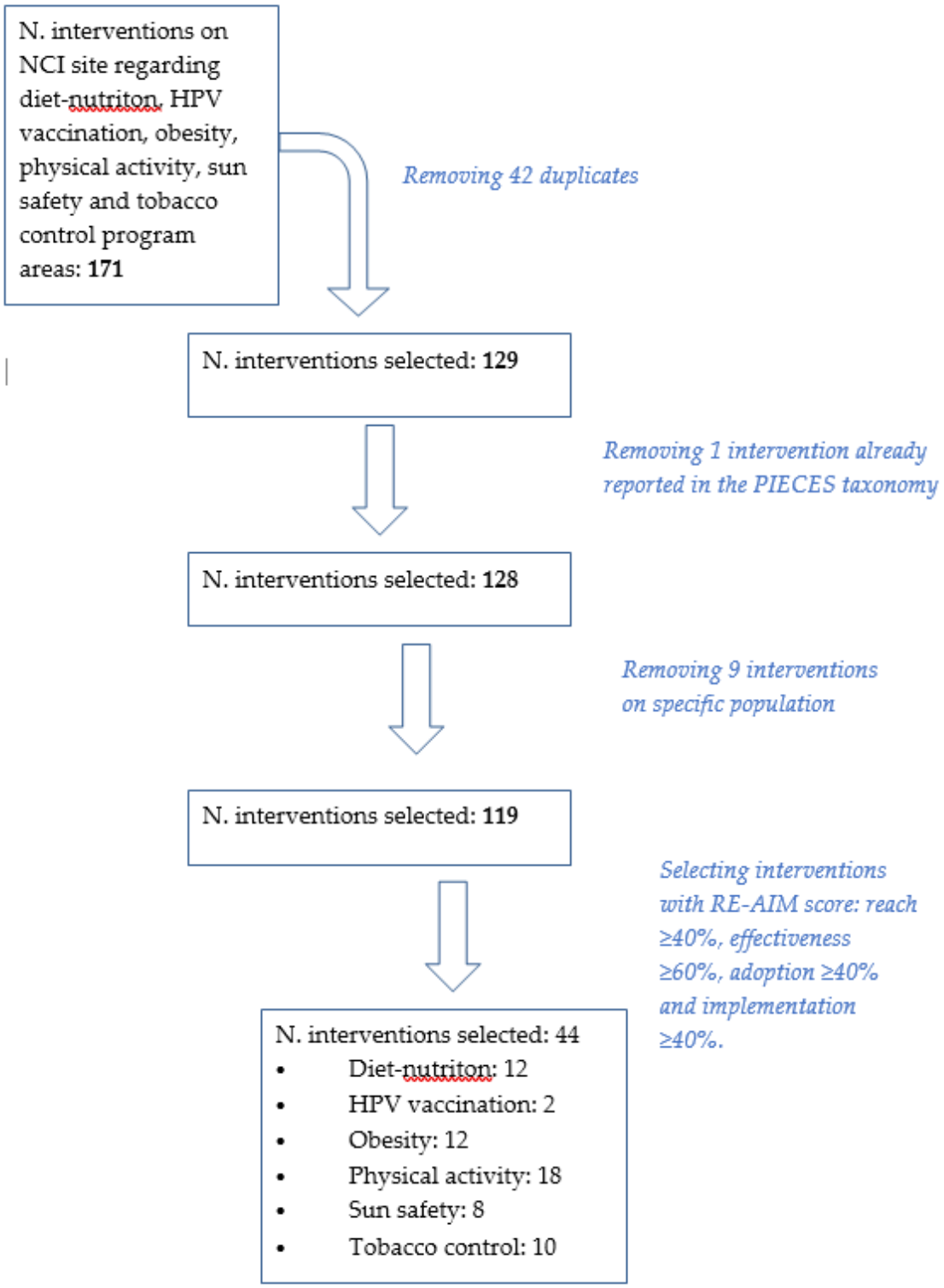
- Reach ≥40% and
- Effectiveness ≥60% and
- Adoption ≥40% and
- Implementation ≥40%.

The cut-offs were established following an agreement among all members of the PIECES Repository working group. The decision was also made on the basis of the scores given to the only study found to be in common with the PIECES taxonomy structure (COPE Healthy Lifestyles TEEN- Physical activity Program Area), which reported:

- Reach: 60%
- Effectiveness: 100%
- Adoption: 80%
- Implementation: 71.4%.

Interventions without an evaluation for all outcomes were removed. So, we selected 27 remained, 22,7% of the total (see “Selected” paper in Excel).

Here the flow chart of the selection of the interventions from the NCI EBCCP website.



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2. Adapting the NCI Repository structure to PIECES-EBPCPP Repository

In order to standardize the material extracted from various sources (such as Cochrane reviews and interventions from the PIECES Implementation sites), studies selected from the NCI Repository have also been incorporated into the PIECES-EBPCPP Repository.

The process of adapting the NCI Repository was supported by artificial intelligence, specifically ChatGPT.

More specifically, the data from the NCI Repository were provided to ChatGPT, which then generated a script to extract all relevant information for inclusion in the PIECES-EBPCPP Repository. Subsequently, the accuracy of the AI-extracted data was carefully reviewed. While the information extracted by ChatGPT was generally accurate, a final verification by the research team was required to correct a few discrepancies.

3. Implementation of logic model to the PIECE-EBPCPP Repository

In order to facilitate the implementation by the public health professionals in their setting, a "logic model" was extracted from each of the cancer primary prevention programmes in the repository. The "logic model" was broken down into four main elements:

- Preconditions ("What is needed to deliver the program in the first place?")
- Actions ("What activities does the program consist of? What activities does a person go through when participating in the program?")
- Output ("What do these activities result in?")
- Mechanisms ("What are the mechanisms that bring about the results?")

The detailed description of these essential and characterizing elements of each prevention program should ideally assist in both the design and implementation phases, for example in the identification of stakeholders, the description of resources to secure, the planning of activities and the description of procedures, the devising of process, output, outcome and impact indicators, and so on. The logical model was extracted from all of the programmes present in the repository, regardless of their source.

This is ongoing work and the programmes are not yet uploaded into the system as there are 7 out of 136 interventions pending to be updated with the logic models.

The PIECE-EBPCPP Repository and all the information will be integrated in the toolkit (https://pieces.itfits-toolkit.com), that is the object of the WP2, and WP3 of PIECES.