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Evidence-informed program development: Using a common components approach to develop universal parenting programs for U.S. military and civilian families

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ABSTRACT

Program development is a complex, iterative process involving multiple steps and decision points. This article presents the common components approach as comparatively efficient, heuristic tool for deciding what content to include in a new program on the basis of current manualized evidence-based programs, alongside theory, basic research findings, and professional judgment. A case study of how this approach was used to develop a universal parenting program for U.S. military and civilian parents of infants (birth to 12 months) is presented. Lessons learned in applying a common components methodology to program development and implications for others who are interested in using the approach in their program work are also discussed.

1. Introduction

Scholars and practitioners agree that the quality of parenting children receive influences their developmental trajectories and paves the way for future success or adversity (National Center for Parent, Family and Community Engagement, 2015; Pinquart, 2016; Sangawi, Adams, & Reissland, 2015). Programs focused on strengthening parenting are considered a viable mechanism for supporting families, and many evidence-based prevention and treatment programs for parents exist. Accordingly, numerous agencies have published reports to support the identification, selection, and implementation of evidence-based parenting programs (e.g., Child Welfare Information Gateway, 2013; Halle et al., 2015; National Academies of Sciences, Engineering, and Medicine, 2016; National Center for Parent, Family and Community Engagement, 2015). Furthermore, a number of online, searchable databases exist that allow researchers, practitioners, and parents to learn about the evidence base and implementation requirements of existing parenting programs, such as the Clearinghouse for Military Family Readiness at Penn State's (Clearinghouse) Continuum of Evidence (www.militaryfamilies.psu.edu/programs), the California Evidence Based Clearinghouse (CEBC) for Child Welfare Program Registry (www.cebc4cw.org), the University of Colorado Boulder's Blueprints for Healthy Youth Development (www.blueprintsprograms.com), and SAMSHA's National Registry of Evidence-based Programs and Practices (www.samhsa.gov/nrepp).

These resources are useful for organizations that are able to implement extant evidence-based parenting programs. In reality, however, various implementation factors may limit the selection and delivery of existing programs (Proctor et al., 2011). For example, an evidence-based parenting program may align well with an organization's mission, but substantial training and implementation costs may exceed its operating budget. In addition, organizations, like the U.S. military, that have high staff turnover rates could find it too expensive to implement these programs as employing such a program would require continuous spending for the training of new facilitators. Moreover, an organization may find a particular parenting program's general approach to strengthening parenting appealing, but they may also find the program's content lacking in an area relevant to their specific mission. For instance, organizations that regard parenting as a public health issue and priority may find current universal parenting programs insufficient, as most do not include specific health promotion content (Gerards, Sleddens, Dagnelie, De Vries, & Kremers, 2011).

In these circumstances, organizations wishing to service parents may choose between adapting an existing program or developing their own. Researchers' interest in understanding how best to adapt existing programs has intensified (Gitlin & Czaja, 2016), and several systematic models have been proposed, such as ADAPT-ITT (Wingood & DiClemente, 2008), M-PACE (Chen, Reid, Parker, & Pillemer, 2013), and Planned Adaptation (Lee, Altschul, & Mowbray, 2008). Less emphasis, however, has been placed on understanding and advancing

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frameworks for developing new programs in an evidence-informed manner (Gitlin & Czaja, 2016; Hoddinott, 2015; Wight, Wimbush, Jepson, & Doi, 2015).

This paper intends to address this gap in the literature by bringing attention to and detailing a methodological approach to program development known as common components (Barth & Liggett-Creel, 2014) or Common Components Analysis (CCA; Morgan, Davis, Richardson, & Perkins, 2018). Specifically, the paper describes an application of a common components approach to the development of Take Root Online, a universal (i.e., targeting the general population) prevention parenting program for U.S. Military and civilian families of infants and toddlers (birth to 3 years), that is part of the THRIVE Initiative. Accordingly, this paper is directly responding to Barth and Liggett-Creel's (2014) call for the increased uptake of common components model parenting programs in the social services field. This paper also discusses lessons learned in applying a common components methodology to program development and examines implications for others who are interested in using the approach in their program work.

2. Program development and the common components approach

2.1. Current approaches to program development

Program development is a multifaceted, iterative process comprised of multiple decision-making steps spanning from initial idea conception to efficacy and effectiveness testing to wide-scale dissemination and sustainability efforts (Onken, Carroll, Shoham, Cuthbert, & Riddle, 2014). Though work devoted to understanding and providing others with systematic guidance in this area has received limited attention (Gitlin & Czaja, 2016; Hoddinott, 2015; Wight et al., 2015), scholars have not completely ignored it in the field. In general, the following three broad approaches to program development exist: theory-based (Glanz & Bishop, 2010), evidence-based (Cajkowski et al., 2015; Craig et al., 2013), and person-based (Yardley, Morrison, Bradbury, & Muller, 2015). While an extensive review of these approaches is beyond the scope of this paper, an overview is provided.

Each of the aforementioned program development approaches gives priority to a different input variable. In the theory-based approach, the theoretical framework that informs the program is given the greatest attention whereas in the evidence-based approach, the currently available research evidence coupled with program evaluation data is regarded as most important. In the person-based approach, the end-users of the program are considered to be the most valuable sources of information. Though each approach emphasizes a different primary development input, these approaches are rarely, if ever, used in isolation in practice. For example, the Medical Research Council's guidelines for developing and evaluating interventions (Craig et al., 2013) considers it best practice to take theory into account in addition to research evidence. Similarly, the person-based approach advocates for engaging in formative research efforts (e.g., focus groups, interviews, and stakeholder meetings) as the primary means for understanding the users' perspectives and lived experiences (Yardley et al., 2015). There is even scholarly work that describes how these approaches can be used in combination to develop an intervention (Band et al., 2017).

Each of these approaches draws attention to important program development considerations and is a valid method. Like Wight et al. (2015), however, we note two important limitations of these approaches as they are currently discussed in the literature. First, all three approaches can be quite complex, as they each require advanced skill sets or resources. For example, utilizing the theory-based approach requires a thorough understanding of the available frameworks that correspond to the behavior change focus of the program (e.g., parenting practices) and how to operationalize the frameworks' key constructs within the program. Simply selecting a popular theory to guide the program is insufficient (Moore & Evans, 2017), and even if an individual knows the “best” theory, there is no guarantee he or she will know how to use that theory to develop a useful program (Bartholomew, Parcel, & Kok, 1998). As another example, the evidence-based and person-based approaches can be resource intensive. Both approaches can require substantial time and monetary investments to generate quality research findings, not to mention the advanced skill sets required to adequately conduct such research. Further, the evidence-based approach can require significant time searching for, filtering through, and determining how best to apply research evidence.

Second, the extant literature provides little guidance on identifying the core components that will inform the program's content. Each approach would appear to suggest that core components can be identified through theory, existing evidence, formative research, or a combination of these approaches. Component identification can certainly happen through one or more of these approaches; however, there does not appear to be a focused, or easily accessible, “how-to” description within the current literature. Given the significance ascribed to core components for prevention and intervention work (Embry, 2004) and their direct influence on program content and materials, researchers and practitioners alike need a pragmatic approach to component identification and an easy to follow demonstration of how to use such an approach. This paper addresses both of these points by presenting the common components approach as a practical, and scientifically rigorous, program development framework.

2.2. The common components approach

A variety of terms have been employed in the literature for the common components approach (for a review see Morgan et al., 2018); however, the underlying assumption remains the same. Namely, programs that have been rigorously evaluated and found to be effective share a detectable set of common components within a specific topic area that can be distilled. Divergence within the various forms of the common components approach focuses mainly on the level at which commonality is assessed. For example, Chorpita, Becker, and Daleiden (2007) and Chorpita and Daleiden (2009) focus on the level of individual strategies or practices contained within evidence-based treatments (EBTs). Ingram, Flannery, Elkavich, and Rotheram-Borus (2008), Rotheram-Borus, Ingram, Swendeman, and Flannery (2009), Rotheram-Borus et al. (2009), on the other hand, are interested in the more global elements not specified in treatment manuals or protocols that cut across effective interventions. Conversely, Embry and Biglan (2008) and Kaminski, Valle, Filene, and Boyle (2008) approach is similar to that of Chorpita's research group; the principal difference being their decision to focus only on strategies that are empirically linked to outcomes.

In an effort to integrate the various lines of thought on the common components framework, Morgan et al. (2018) proposed a four-fold model, which distinguishes among content, process, barrier reduction, and sustainability components. Content components include the topics and skills taught in a program (e.g., discipline techniques, coping skills, health promotion strategies), while process components entail programs' methods (e.g., role-plays, modeling, and skill practice) and modes of delivery (e.g., group settings, online, and print materials). Barrier reduction components involve those features of a program that are related to directly supporting participants' goal achievement (e.g., providing food, clothing, and stipends), access to (e.g., transportation and child care), and involvement in the program (e.g., family meals, stigma reduction, and motivational incentives). Finally, sustainability components have to do with how a program goes about providing continued support to participants (e.g., support groups, referrals to needed services, and newsletters).

This paper demonstrates how a common components approach, similar to that presented by Morgan et al. (2018), can be a comparatively efficient, heuristic tool for determining the core components that will influence the structure and content of a new program. The approach described here uses a systematic and rigorous coding process to distill the components that comprise a set of evidence-based manualized

protocols (i.e., programs) in a manner similar to that presented in Chorpita, Daleiden, and Weisz's (2005) Distillation and Matching Model. Thus, the common components approach described here fits primarily within the evidence-based approach to program development. As will be presented later in the paper when the method is described in action, it does not require advanced training or significant resources. This is a key advantage of the approach. Note, that while this approach can stand on its own, it can be integrated with other approaches. Following distillation, the identified components, theory, practitioners' professional judgment, and other sources of information can all be used to determine how to develop program curricula and materials.

While each of the component areas proposed by Morgan et al. (2018) are critical for program developers to consider, the focus in this paper is limited to content components because they directly inform the development of program curricula and materials and by extension influence the probable *active ingredients* (Embry & Biglan, 2008) of the program. As previously noted, this is an aspect of program development in need of greater specificity and practicality. Previous scholarship has identified common content components for a variety of intervention programming (e.g., Boustani et al., 2015; Chorpita & Daleiden, 2009; Kaminski et al., 2008), demonstrated the positive impact of programs and protocols developed with this approach on treatment outcomes in RCTs or pilot studies (Chorpita et al., 2013; Jouriles et al., 2009; Liggett-Creel, Barth, Mayden, & Pitts, 2017), and described a direct service model for clinicians using this approach that allows them to develop individualized, evidence-informed treatment plans (i.e., the Managing and Adapting Practice [MAP] model; Chorpita, Daleiden, & Collins, 2014). However, no published research could be located that provides a straight-forward depiction of how a common components approach can be used to develop a new, universal prevention program through the identification of common content components. This paper addresses this gap.

This approach to program development does have limitations. Using a common components approach does not guarantee the most effective techniques or practice elements for a given topic will be identified. Common components are simply the elements frequently found in multiple, evidence-based, manualized treatments but, on their own, are not causally linked to outcomes (Barth et al., 2012). Further, the findings of CCAs are dependent on the degree of reporting by developers on the details of the individual program and a solid program evaluation. Nevertheless, alongside Barth and Liggett-Creel (2014), this paper argues that drawing on evidence-based programs (EBPs) and distilling the components may be similarly effective as using a manualized model, which makes it worth the resource investment.

3. Take Root Online and the THRIVE Initiative

Take Root Online is one of multiple parenting programs within THRIVE, an initiative that was developed by research scientists at the Clearinghouse in partnership with staff from the Department of Defense's Office (DoD) of the Deputy Assistant Secretary of Defense for Military Community and Family Policy. In 2013, the DoD approached the Clearinghouse with a request to create developmentally-comprehensive, evidence-informed parenting programs for military and civilian families with children from birth to eighteen years old that are affordable with respect to training and implementation costs and that would be owned by the federal government. In order for THRIVE to truly be developmentally comprehensive it needed to comprise a series of evidence-informed, age-graded parenting programs (Briesmeister & Schaefer, 2007; see also Fig. 1). Moreover, parenting practices promoting physical health (e.g., child feeding strategies, daily physical activity, and monitoring screen time) were considered a priority, given their linkage to the long-term well-being of children and the increasing problem of overweight and obesity in U.S. military (Tanofsky-Kraff et al., 2013) and civilian (Skinner, Ravanbakht, Skelton, Perrin, & Armstrong, 2018) communities.

All THRIVE programs, including Take Root Online, seek to harness parents' potential for fostering holistic, community youth development and resiliency throughout childhood and adolescence. The primary theoretical assumption undergirding all THRIVE programming is that both what parents do (e.g., parenting practices) and how they do it (e.g., the affective quality of parenting interactions) are important for creating an optimally nurturing parent-child relationship and fostering subsequent positive child development outcomes (Darling & Steinberg, 1993; Dix, 1993; Lamborn, Mounts, Steinberg, & Dornbusch, 1991). All programming within the THRIVE Initiative focuses on the following learning domains: (a) positive parenting practices, (b) parent and child stress management, and (c) child physical health promotion.

This article focuses on how a common components approach is used to inform the development of Take Root Online, the THRIVE program targeting parents and caregivers of infants and toddlers from birth to three years of age. Take Root Online is a universal prevention program and is subdivided into three program tracks: (a) birth to 6 months; (b) 6 to 12 months; and (c) 1 to 3 years of age. All programming is delivered online, and each of the three program tracks consists of the following three 15- to 30-min sessions: (a) “Through your eyes,” focusing on parental needs; (b) “Through your baby's eyes,” centering on the child's needs; and (c) “Figuring it out together,” emphasizing how parents can apply what they have learned in their interactions with their child.

Based on the availability of EBPs, two independent CCAs were conducted (i.e., one covering birth to 12 months, and one covering 1 to 3 years of age) to guide program development. The results of these analyses together informed the content and curriculums of the three program tracks. While the processes for each of these CCAs was the same, as an exemplar, only the findings of the first analysis (i.e., Take Root Online, birth to 12 months) are presented.

4. The THRIVE common components approach

The development of each THRIVE program comprises twelve decision points (see Table 1). The Clearinghouse researchers integrated elements of Chorpita et al.'s (2005) Distillation and Matching Model (i.e., decisions # 4 and 5) with Morgan et al.'s (2018) four-fold component model (i.e., content, process, barrier reduction, and sustainability components; decisions # 2–3, 5, 10 and 12) to conceptualize and advance these decision points, three of which specifically relate to the CCA process (i.e., Decisions #4, #5, and #6). This section focuses on overviewing these three decision points, in terms of the specific determinations they involve, with examples from the development of the Take Root Online program to illustrate the application of the common components approach used. Prior to this overview, the first three decision points are quickly reviewed to establish context.

4.1. Decisions #1–3: Defining target population, program focus, and delivery mode/method

At the request of the DoD, all universal prevention programs within the THRIVE Initiative are designed for implementation with both military families and their civilian counterparts. Accordingly, while military families have unique needs that require consideration in programming (e.g., impact of deployment; Trautmann, Alhusen, & Gross, 2015), all but one THRIVE program target the general parenting population. As discussed previously, Take Root Online focuses on strengthening the parent-child, as opposed to co-parent, relationship.

To increase viability and potential long-term feasibility, DoD partners were interested in and open to utilizing online technologies; for example, online facilitator training and certification as this platform has the potential to be more sustainable for the U.S. Military than face-to-face, group trainings. For this reason, we decided that Take Root Online would be delivered via an online learning management system. Throughout the development phase, the Clearinghouse scientists worked closely with their in-house learning design team to determine

THRIVE Initiative Program Areas						
Program Area	**Take Root**		**Sprout**	**Grow**		**Branch Out**
Program	Take Root Online	Take Root Home Visitation	Sprout Online	Grow Face-to-Face	Grow Online	Branch Out
Target population: Parents and caregivers of…	Infants & Toddlers (0-3 years)	Infants & Toddlers (0-3 years) *at risk for maltreatment*	Preschoolers (3-5 years)	Grades K – 5 (5-10 years)	Grades K – 5 (5-10 years)	Grades 6-8 (10-14 years) Grades 9-12 (14-18 years)
Mode of delivery	Online	Delivered by home visitors	Online	Face-to-Face	Online	TBD
Level of prevention	Universal	Targeted	Universal	Universal	Universal	Universal

Fig. 1. THRIVE Initiative program areas.

the most effective online delivery methods for the program content. Take Root Online comprises a combination of direct instruction (i.e., written content), interactive activities (e.g., multiple choice and short-answer questions, sliders and 'drag-and-drops'), and between-session homework (i.e., skills practice).

4.2. Decision #4: Identifying and selecting programs for CCA

The first step in the CCA consists of two parts: (1) program identification, which involves identifying a set of manualized EBPs with similar aims and foci as the program to be developed, from which an initial list of components can be extracted and (2) program selection, which involves reducing this list of identified programs to a final set for analysis.

4.2.1. Program identification

To develop an initial list of extant programs, the THRIVE research scientists drew on information from two program repositories: The Clearinghouse's Continuum of Evidence (Continuum) and the California Evidence Based Clearinghouse (CEBC) for Child Welfare Program Registry. Initial identification of programs for the CCA is primarily based on information gleaned from the organizations' websites and, specifically, program fact sheets produced by these two organizations. The Clearinghouse uses a rigorous process to review, categorize, and place programs on the Continuum and performs quarterly inter-rater reliability checks among all research scientists performing program placements. To determine a program's placement, multiple criteria are considered (i.e., significant effects, sustained effects, successful external replication, study design, and additional criteria regarding study execution [e.g., representative sample, modest attrition, practical significance, and adequate outcomes measurement]; Karre et al., 2017). Four possible placement categories exist: *effective* (program demonstrates, in multiple rigorous studies, positive and sustained effects); *promising* (program demonstrates, in at least one rigorous study, positive and somewhat sustained effects); *unclear* (program has not been evaluated, or has been evaluated with mixed results or using a study design that lacks methodological rigor); and *ineffective* (program failed to demonstrate, in multiple rigorous studies, positive and sustained effects or demonstrates significant negative effects). To ensure scientific rigor during the Continuum placement process, only evaluations

Table 1
Overview of the decision process underlying THRIVE program development.

THRIVE evidence-informed program development: decision processes		
Decision #1	Identify and define target population and program focus	Determine (a) the parent population based on child developmental period and (b) the program's relational emphasis (i.e., co-parent or parent-child).
Decision #2	Define mode of delivery[a]	Determine the medium for program implementation (e.g., online, face-to-face, telephone).
Decision #3	Define method of delivery[a]	Determine the means of conveying program material to participants (e.g., direct instruction, skill practice, homework assignments).
Decision #4	Identify and select programs for CCA	Compile an initial list of programs based on broad inclusion criteria and refine it to the most relevant programs based on more nuanced inclusion criteria.
Decision #5	CCA[b]	Engage in an iterative process of: (a) component identification; (b) data reduction; and (c) and component finalization.
Decision #6	Research and identify health promotion components	Conduct systematic literature reviews on health promotion topics germane to the program's developmental period.
Decision #7	Lay out theoretical framework	Create a theory of change by identifying, selecting, and operationalizing the theories that undergird the program's finalized components and are relevant to the program's developmental period.
Decision #8	Develop program logic model	Use the theory of change to visually depict the linkages between the program inputs (e.g., target population, delivery mode and method, finalized components) and outputs (e.g., short-, intermediate-, and long-term outcomes).
Decision #9	Identify and select curriculum writer	Locate an internal or external content expert to draft the program's curriculum.
Decision #10	Research and identify barrier reduction strategies[c]	Conduct systematic literature reviews to determine best practices for helping to reduce barriers to program participation; perform a CCA on the programs identified in step four to determine if commonly employed barrier reduction strategies exist.
Decision #11	Develop evaluation plan	Create a detailed report that outlines how the newly developed program will be evaluated with respect to implementation and treatment outcomes.
Decision #12	Research and identify sustainability strategies[d]	Conduct systematic literature reviews to determine best practices for long-term program success; perform a CCA on the programs identified in step four to determine if commonly employed sustainability strategies exist.

[a] Process factors.
[b] Knowledge factors.
[c] Barrier reduction strategies.
[d] Sustainability factors.

published in peer reviewed journals are considered (for further details, see Perkins, Aronson, Karre, Kyler, and DiNallo (2016)).

Similarly, the CEBC utilizes a rigorous review process to rate program effectiveness. Their rating scale is numerical and ranges from one to five, in which one represents strong research evidence and five represents concerning research evidence (i.e., evidence of negative program impact). Like the Clearinghouse's Continuum, criterion such as statistically significant program effects and sustained effects help guide program placement, and only evaluations published in peer-reviewed journals are considered. However, the CEBC focuses specifically on reviewing programs related to child welfare.

The number of programs placed on the Clearinghouse's Continuum is extensive (i.e., as of the end of 2017 the Continuum features over 1100 vetted programs). Given the narrower focus, the number of programs rated by the CEBC is considerably smaller (i.e., as of the end of 2017, 453 programs are listed in their registry). In the CCA used for all THRIVE programming, these two program repositories are used in a complementary fashion to help ensure maximum identification of germane programs. In cases when information is missing or unclear in both the Continuum and CEBC fact sheets, program websites or relevant peer-reviewed articles on the program are located and reviewed. As a final quality assurance step, programs that are not included on the Clearinghouse's Continuum or the CEBC's program registry, but are recommended by Clearinghouse researchers or external consultants with whom the Clearinghouse has previously worked, are also identified.

4.2.2. Program selection

The goal of program selection is to compile a final list of programs for the CCA that is evidenced-based, developmentally appropriate, and relevant to the THRIVE learning domains and overarching goals of the specific THRIVE program to be developed. To accomplish this goal, each program included on the initial list is compared with inclusion criteria established by the Clearinghouse researchers. Any program that fails to meet these criteria is removed. To illustrate the type of inclusion criteria used during this process, an overview of the decision points involved in identifying and selecting programs for Take Root Online is presented in Table 2.

Based on these criteria, 46 programs were initially identified in the Take Root Online CCA. Of these, 10 fully satisfied the established inclusion criteria (Fig. 2; see also, Table 3). The main reasons for excluding 36 parenting programs from the final list included the following:

- Lack of evidence of effectiveness (i.e., the program did not receive a Continuum rating of Unclear + or greater OR a CEBC rating of three or greater [$n = 24$]);
- Lack of evidence of effectiveness *specifically* in an infant population (i.e., birth to 12 months [$n = 4$]);
- Program did not target at least one of the THRIVE domains (i.e., positive parenting, stress management, or health promotion [n = 4]); and/or
- Program focused on an extreme issue or population with a specific problem(s) (n = 4).

4.3. Decision #5: Common Components Analysis

Decision #5 of the CCA is an iterative process of manual coding that is employed to disassemble the identified manualized EBPs into individual components and, subsequently, define and distill these components to remove duplication (see Fig. 3).

4.3.1. Extract and define components

Once a final program list has been developed, two designated raters (Master's- or PhD-level Clearinghouse researchers), independently identify the content components of each included program by reviewing information provided from the Clearinghouse website, the CEBC website, the program website, and published research on the program. Following this, they independently develop a working definition for every identified content component by relying on information provided from the previously listed sources. After this process is completed, the raters meet to discuss any discrepancies found between the identified components and working definitions. The goal of this meeting is to achieve consensus on the final list of components for each program. Disagreements are discussed and resolved.

Table 2
Overview of the Take Root Online program identification process.

Decision points involved in identifying programs for take root online (birth to 12 months) common components analysis
Sources for identifying programs ● Clearinghouse for Military Family Readiness Continuum of Evidence (Continuum) ● California Evidence Based Clearinghouse for Child Welfare Program Registry (CEBC) ● Expert opinion (e.g., programs recommended by Clearinghouse employees or external consultants)
Decision points Phase 1 – Compiled an initial list of programs for consideration. To be considered, a program had to: A. Focus on parenting or the parent-child relationship through inclusion of a parent component (i.e., instruction delivered to parents or caregivers). B. Target at least one of the three THRIVE learning domains: positive parenting practices, parent and child stress management, and health promotion. C. Target parenting in the prenatal period and/or infancy. a. For program identification purposes, infancy is defined as birth to 12 months. b. Programs that indicated that they encompassed a broad age range (e.g., birth to 3 years or birth to 5 years) were generally included. c. Programs were considered for inclusion as long as the lower bound age preceded 12 months and other conditions were satisfied (see Phase 2, criterion B and C). D. Be currently available for implementation. Phase 2 – Narrowed the initial list of programs to those most relevant to Take Root Online (birth to 12 months). To be selected for the final list of programs, a program had to have: A. Evidence of effectiveness. Specifically, a Clearinghouse Continuum rating of Effective-RCT, Effective-Quasi, Promising, or Unclear +; a CEBC rating of 1, 2, or 3; or published research demonstrating effectiveness in cases where the program was not rated by either registry. a. Contradictory ratings: If a program received an acceptable rating (2 or 3) from the CEBC but was rated Unclear 0 on the Continuum, the descriptions of the program's evidence on the Continuum and CEBC were reviewed. [Note that all programs rated Unclear + or higher by the Clearinghouse either received a 1–3, or were not placed, on the CEBC]. B. Evidence of effectiveness in the target population of Take Root Online (i.e., the studies that have demonstrated a program's evidence needed to include a prenatal and/or parents of infant population). a. The description of the program's evidence in the Continuum *and* CEBC fact sheets was reviewed. If more detail on the sample was needed, then specific peer-reviewed articles used by each organization to make their placements were reviewed. i. A program was included if at least one study demonstrating evidence of effectiveness included a prenatal and/or infant population. ii. In cases where a study included a range of ages that reached outside of the specified population (e.g., over 12 months), the mean age of the sample was used as the determining factor. If no mean age was reported, the study was excluded. C. Relevance to the THRIVE model in content and delivery mode/method. Decisions were made on a case-by-case basis and took into account the following factors: a. For programs that targeted broad age ranges (e.g., birth to 5-year-olds), the amount of content relating to the prenatal and/or infant period was considered. b. Focus on an extreme issue (e.g., trauma, morbid obesity, abuse, and incarceration): i. Programs targeted towards parents or children with clinical-level problems or very serious and context-specific challenges generally *were not* included. ii. If program participation was generally predicated on a referral (e.g., by a family service agency or related authority), then it was not included. Referrals were taken as a sign that a program was focused on an extreme issue. Programs targeted towards specific but common family contexts, or programs for at risk children or parents, generally *were* included. This would include programs geared towards Military families, stepfamilies, families going through divorce, and parents at risk of child maltreatment.

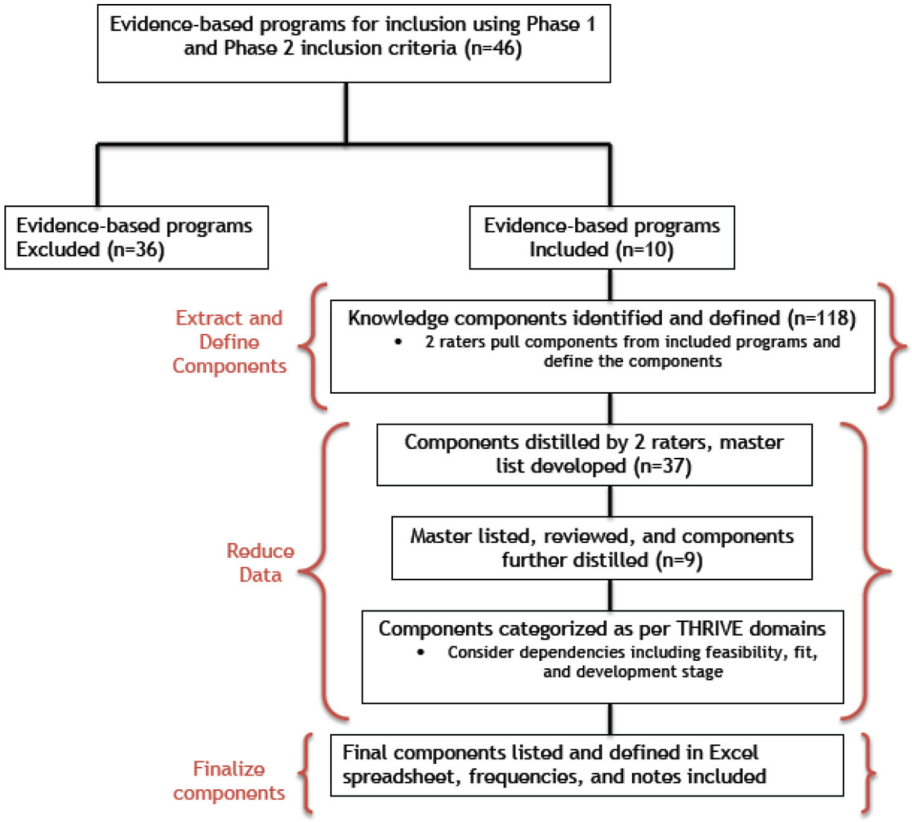

Fig. 2. Overview of component extraction, definition, and reduction for Take Root Online CCA.

4.3.2. Reduce data

Once the content components and definitions are finalized within programs, a master list is generated. Definitions are compared and reduced into larger, mutually exclusive categories through a process of open dialogue. The near-final, non-redundant master list is independently reviewed once more by three Clearinghouse researchers. At least one of these researchers has *not* been involved in Decisions #4 and #5 (*extract and define components* stage). Bringing in a fresh perspective at this point in the process is done to ensure integrity and encourage critical thinking in the combining and categorizing of the final components per the three THRIVE domains (i.e., positive parenting practices, stress management, and health promotion). A component could fall within more than one domain or potentially none. This process helps to determine which components should be included in the program. In other words, the program developers want to ensure the common components that are included align with the overall framework for the THRIVE Initiative, and, ideally, the components should be somewhat equally distributed across the three THRIVE domains. Findings are discussed, and, if professional opinions vary, discussion is pursued with the aim of reaching group consensus.

In the Take Root Online CCA, 118 components were initially identified during Decision #5 (i.e., *Extract and define components*). Through the systematic process that comprises the *reduce data* stage, these 118 were reduced to nine final common components (see Fig. 2). For example, a number of components relating to parent-child interactions were identified, such as responsive parenting, sensitive parenting, safe haven, secure base, and avoiding harmful parenting. Upon further review, it was determined that all of these components focused on fostering positive parent-child interactions and strengthening the parent-child relationship. Consequently, they were combined into one overarching component labeled *positive parent-child interaction*. After identifying the set of final components, they were placed within one or more of the THRIVE domains (see Fig. 4).

4.3.3. Finalize components

In the last stage of Decision #5, the list of components is finalized and includes a working definition and description for each, as well as the number of programs that employ each component. The components that have a higher frequency across the final list of programs are given greater weight for inclusion in the new program curriculum. Additionally, detailed documentation is kept of any additional, relevant decision-making information (e.g., brief rationale as to why specific components were combined during the *reduce data* stage). Table 4 presents this information as it relates to the Take Root Online CCA.

4.4. Decision #6: Research & identify health promotion components

To date, positive parenting practices and stress management components are widely emphasized in existing manualized evidence-based parenting programs; conversely, health promotion components are not. As seen in Table 4, health promotion components occurred with the least frequency. Given this, the CCA described so far in this paper is not sufficient for identifying health promotion components for inclusion in THRIVE programs, all of which have a focus on child physical health promotion.

Accordingly, to identify evidence-based or evidence-informed child health promotion practices for inclusion in program materials, systematic reviews of relevant peer-reviewed health promotion literature must be conducted. Such reviews allow for the gathering and synthesis of information on specific practices and strategies to promote, for example, responsive feeding and routines for adequate infant sleep. Reviewing the literature is also critical to capturing current research and innovative topics. Most of the EBPs examined during Decision #4 (i.e., *Identifying and selecting programs for CCA*) of the Take Root Online CCA were over a decade old. Much of the classical literature that guided the development of these programs still stands; however, capturing insights, skills, and strategies from more recent and emerging research is critical when developing new programs.

Table 3
Final list of identified programs.

Program	Program focus	Program content	Mode of delivery	Program structure	Continuum rating	CEBC rating
Nurse Family Partnership (NFP)	Health Promotion	Healthy behaviors during pregnancy and child's early years; Infant care; Self-care; Family & friends; Family planning; Goal setting (e.g., maternal education, employment)	In person	64 planned home visits over 2.5 years; visits last 60 to 90 min	Promising	1
Family Thriving Program (FTP)	Parenting	Problem-solving parenting challenges & conflicts; Safety; Social support; Accessing community resources	In person	Home visits last for 1 year; visits start with two per month and gradually decrease to one every other month	Promising	NP
Healthy Families New York	Parenting	Locating and accessing community resources; Bonding; Monitoring development	In person	Home visits start before birth and occur twice a week until 6 months; decrease to once a week at 6 months and then occur quarterly until the child is 5, or starts kindergarten or a Head Start program	Unclear +	NP
Text4Baby	Health promotion	Prenatal care; Safe sleep; Immunization; Breastfeeding; Nutrition; Oral health; Family violence; Safety; Physical activity; Injury prevention; Mental health; Substance abuse; Developmental milestones; Labor & delivery; Car seat safety; Exercise; Breaking news related to maternal and child health	Mobile device	3 texts a week starting in pregnancy and continuing until the child's 1st birthday.	Unclear +	NP
Parents as Teachers (Born to Learn Curriculum)	Parent-child relationships	Parent-child interaction; Attachment; Discipline; Health; Nutrition; Safety; Sleep; Transitions/routines; Healthy births; Family strengths, capabilities, skills, & protective factors; Child screenings; Parent support groups; Community resources & access	In person	Monthly visits lasting 1 h; depending on need, some families may require a second monthly visit	Unclear +	3
Healthy Families America (Home Visiting for Child Well-Being)	Parent-child relationships	Parent-child interaction; Family risk & protective factors; Nurturing behaviors; Child development skills; Health & safety; Developmental screening; Connection to medical care; Connection to needed community resources/services	In person	Weekly home visits occurring for at least 6 months after birth; home visits last about 50 to 60 min. As families meet certain criteria, home visits are reduced to biweekly, monthly, and quarterly visits. Program typically runs until the child is 3 to 5 years of age.	NP	1
Circle of Security - Home Visiting-4 (COS-HV4)	Parent-child relationships	Individualized therapy informed by attachment; Core elements of attachment: Secure base, attachment behavioral system, internal working models	In person	1 out-of-home assessment lasting about 3 h, followed by 4 home visits lasting about 1.5 h each; home visits occur every 2 to 3 weeks over a 3-month period	NP	3
Mellow Babies	Parent-child relationships	What do babies do all day; What can babies do; Bonding; Emotional & social development; Sleep; Play; Harmful parenting; Safety in the home; Parental personal/relationship issues (depression, self-esteem, domestic violence)	In person	14 weekly 8-h sessions that include 5 h of group sessions and lunch	NP	3
The Upstate New York Shaken Baby Syndrome Education Program (SBS)	Parenting	Normalcy of infant crying; Dangers of violent infant shaking; Calming a crying infant; Reducing caregiver frustration & anger; Selecting other infant caregivers	In person	One brief (about 15 min) contact with parents by an RN in the maternity ward	NP	3
InfantNet (Content is Playing and Learning Strategies Curriculum [PALS])	Parenting	Infant signals; Responding to signals; Maintaining a baby's interest; Introducing new toys and/or activities to the infant; Developing communication skills; Reading to infants; Integrating content into daily routines	Online	11 self-paced sessions	NP	NP

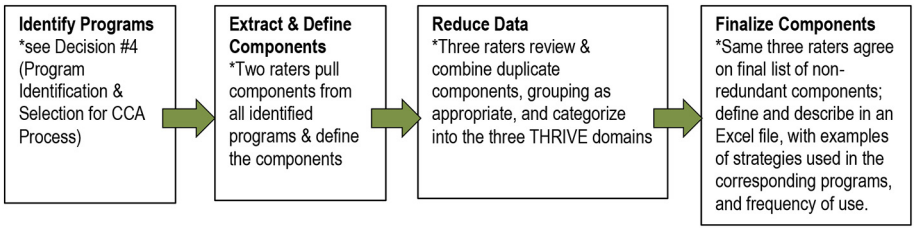

Fig. 3. Sub-tasks comprising Decision #5.

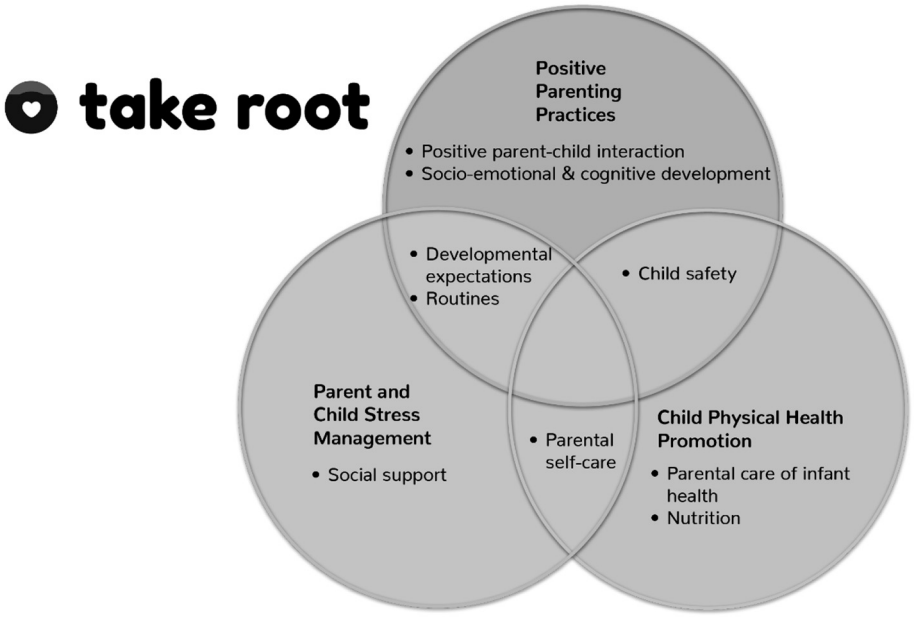

Fig. 4. Categorization of Take Root Online final components as per the three THRIVE domains.

The health promotion-related literature review conducted during the Take Root Online CCA process included the following steps:

- Identify peer-review journal articles using databases, including PubMed, and then search for additional articles using keywords from sourced articles (e.g., *age related*: infancy/infant; *parenting related*: parenting, parents, parenting strategies, family intervention, intervention; and *health promotion related*: infant feeding, infant nutrition, obesity prevention, physical activity/inactivity, sedentary, screen time, routines, responsive feeding, complementary feeding, feeding behavior, tummy time, sleep, health education, and health promotion);
- Study clinical trials and interventions included in these articles to identify specific parenting strategies used to promote healthy behaviors;
- Review references from articles to identify additional publications;
- Search clinicaltrials.gov for additional and ongoing trials related to health promotion or childhood overweight and obesity prevention; and
- Develop lists of evidence-based strategies on the basis of current health recommendations (e.g., Institute of Medicine and American Academy of Pediatrics) identified during the review, and ensure these strategies align with the final content components that have been selected.

A summary of the evidence-based health promotion strategies identified during this review and information on current guidelines/recommendations, evidence-based strategies, and references are recorded and aligned with the final list of components (see Table 4).

5. Discussion

In this article, drawing from existing work around common components as documented above (e.g., Chorpita et al., 2005; Morgan et al., 2018), a common components approach is detailed that has been used in the development of parenting programs focused on positive parenting, stress management, and health promotion practices. As an example, the article gives specific focus to the process as it is applied to the development of Take Root Online, a universal prevention program for parents of infants (i.e., birth to 12 months). This paper provides researchers and practitioners with a guide that can inform future program development efforts. It also increases confidence in the utilization of evidence-informed programs developed through a common components approach, such as Take Root Online.

While this is a strong start, identifying common components is merely the first step in the program development process. To develop an evidence-informed program, multiple other steps are required, including advancement of a logic model; theory of change; program curriculum, including content, participant activities and resources; and an evaluation plan and tools (Bartholomew-Eldredge et al., 2016). Within the approach used in the THRIVE Initiative, the final common components identified through the CCA are directly drawn upon when developing each of these other program parts. For example, when writing a logic model for Take Root Online, the final common components were listed as the program's targeted risk and protective factors. Following this, short-term, intermediate, and long-term parent and child outcomes were selected to align with each of these factors. Further, the program content itself was mapped out and drafted around these components, and one to two final components were operationalized and taught in each parent session.

Table 4
Summary of Take Root Online (birth to 12 months) CCA findings.

CCA findings				Supplementary review of health promotion literature
Component	Domain	Definition	Frequency	Key Findings Related to Each Component
Parental self-care	Stress management/health promotion	Focuses on teaching parents about the importance of caring for themselves and provides best practices on how to care for themselves. For example, education about prenatal health issues, such as getting and using proper medical care, addressing potential health complications, adhering to healthy diets, avoiding substances (e.g., cigarettes, alcohol, and drugs), seeking support for postnatal depression, meeting their own sleep needs, and gaining skills and strategies that can help them cope with stress, is considered.	14	Focuses on promoting a healthy diet for mothers (e.g., increasing fruit and vegetable intake, reducing sugar sweetened beverages), and encouraging physical activity (e.g., including baby in activities, such as taking walks). Also educates parents on the importance of modeling these healthy behaviors.
Child safety	Positive parenting practices/ health promotion	Focuses on educating parents about creating safe house environments and practices, including around sleep, that lessen the likelihood of a child getting hurt or ingesting harmful substances.	11	Focuses on educating parents on safety issues related to infant feeding (e.g., the safe handling and storage of breast milk and formula), safe sleep guidelines for infants, and providing safe spaces for play (e.g., during tummy time).
Socio-emotional & cognitive development	Positive parenting practices	Focuses on educating parents about the social, emotional, and cognitive needs of their infant and how they can foster/nurture their child's development through their parenting practices.	10	Focuses on educating parents on screen time recommendations for children, strategies for providing opportunities for infants to be physically active (e.g., tummy time and reducing the amount of time infants spend in swings and other seats), and engaging their infant in play.
Positive parent-child interaction	Positive parenting practices	Focuses on educating parents about skills and strategies they can use to promote their relationship with their child (e.g., responsive/sensitive parenting; safe haven; secure base; and avoiding harmful parenting).	9	Focuses on educating parents about responsive feeding (e.g., recognizing hunger and satiety cues) and strategies for soothing their child other than feeding to soothe.
Developmental expectations	Positive parenting practices/ stress management	Focuses on providing development education to mothers to foster awareness of the child's specific developmental milestones and behaviors (e.g., tantrums when a child may be teething, the normalcy of infant crying, infant sleep needs).	9	Focuses on educating parents on the developmental signs that their child is ready to begin solid foods.
Social support	Stress management	Focuses on educating parents about the importance of support networks and supportive behaviors and how to develop and/or strengthen these networks and behaviors.	5	
Nutrition, including breastfeeding	Health promotion	Focuses on providing education and tips to mothers on healthy food choices/ options for mother and baby and education and encouragement about breastfeeding. In addition, provides information on where to get assistance if help acquiring food is needed.	3	Focuses on educating parents on feeding recommendations for infants (e.g., encouraging breastfeeding, providing only breast milk or formula for the first 6 months of age, delaying the introduction of solid foods). Also provides education on the recommendations to avoid providing fruit juice and sugar sweetened beverages to infants.
Routines	Positive parenting practices/ stress management	Focuses on educating parents about creating and using routines in everyday situations (e.g., to promote healthy infant sleep habits) and discusses times of transitions.	3	Focuses on promoting healthy infant sleep habits (e.g., creating a calming bedtime routine and avoiding the use of feeding to put infants to sleep). Promotes setting family routines (e.g., eating dinner together as a family, turning off the television at mealtimes).
Parental care of infant health	Health promotion	Focuses on educating parents about the physical aspects of caring for an infant's health (e.g., taking temperatures, noticing signs of illness, and communicating with medical providers right away).	3	

As with any program development strategy, the common components approach has its limitations. For instance, the incomplete reporting of program details by the developer can be an obstacle to identifying components (i.e., during Decision #5, *Common Components Analysis*). When developing Take Root Online, the research team searched program curricula from developer websites and publications, but not all details were available for all programs. So, while the researchers endeavored to extract and analyze all content components, there is no doubt that some components were erroneously omitted from the initial master list. Further, program developers were not always available to answer outstanding questions, and it was not always possible to purchase program curricula due to resource constraints. The common components approach is also limited by a lack of research on the effectiveness of individual program components; thus, the current evidence-base is for a program in its entirety (i.e., does a *compilation* of components lead to effective outcomes, or not) and not for the individual components that constitute the program. Thus, one cannot know with certainty if the components identified through this type of CCA are the most effective for behavioral change (Barth & Liggett-Creel, 2014). Instead, new programs developed this way must undergo a process of rigorous implementation and evaluation in order to demonstrate their effectiveness.

This said, to date, Clearinghouse researchers have drawn on a common components approach in developing multiple THRIVE programs, which are performing well upon being subjected to rigorous evaluation. For example, the Clearinghouse has had two successful pilot tests of the Grow parenting program (for parents of 5- to 10-year-olds) in the past two years: one in a civilian population and one in a military population. The purpose of these pilots was to examine implementation outcomes and address practical challenges and curriculum refinement. Moreover, both pilots have produced encouraging results (e.g., see Czymoniewicz-Klippel, Chesnut, DiNallo & Perkins, 2017). The Take Root Online program addressed in this paper will undergo its first evaluation in 2018.

In summary, this program development process is strengthened from the beginning because it utilizes peer-reviewed research findings that draw on the components of EBPs that are currently available to practitioners. Moreover, this process is arguably more time efficient and accessible for those outside of the academy, as it involves using publicly available program repositories that have already taken the time to compile and systematically review the programs. Admittedly, this does not completely eliminate the need to find additional research or conduct additional reviews, but it is a promising starting point. In addition, this common components approach informs the development of the THRIVE Initiative parenting programs, which are available at no cost to practitioners working in military and civilian communities. Fundamentally, using a common components approach has allowed the Clearinghouse researchers to identify content components that support the three learning domains in the THRIVE Initiative and that have been shown in previous research to produce significantly positive outcomes for parents of children in the specified age group.

6. Lessons learned

Programs based on common components that cut across rigorously tested interventions have tremendous potential to positively impact individuals, families, and societies (Barth & Liggett-Creel, 2014). This paper argues that a common components approach is a useful, heuristic tool that applied researchers and practitioners can use to efficiently summarize vast amounts of information to make evidence-informed decisions during program development. However, as Morgan et al. (2018) proposed, content is just one program domain that should be considered. Developers may find it useful to simultaneously conduct CCAs for content, process, barrier reduction, and sustainability components. These components likely influence each other in significant ways (e.g., the mode of delivery may impact the effectiveness of certain ideas or skills taught in the program), so considering them alongside one another may enhance the quality of a newly developed program.

When advocating for the use of any type of program development tool, there is the risk that it may be oversimplified. Program development is a complex, iterative process, and, while a common components approach affords program developers many benefits, it cannot guarantee the development of an effective program. Rather, it must be used in conjunction with theory and basic research findings to maximize its potency (Glanz & Bishop, 2010). Given that a number of theories share constructs in common (Michie et al., 2005), the use of a common components approach may very well help to reduce the complexity surrounding the selection and operationalization of theory in the program development process.

The common components approach described here, like any methodological approach, depends heavily on what data are used. As previously mentioned, accessing all sources of information necessary to compile a truly comprehensive list of components for each program included in the analysis proved challenging. This highlights a greater need within the field for program developers to engage in reporting practices that make it easy to determine what their interventions' content components are and how they have been operationally defined. Just as there is a call for researchers to make their data openly available to other researchers (Bertagnolli et al., 2017), encouraging program developers to make their core components accessible to others would be valuable to practitioners and researchers alike.

In a related vein, the sources used to identify programs for a CCA need to be considered. The Clearinghouse's Continuum and the CEBC were used in this case, but these are only two of several databases that provide information on prevention and intervention programs. Each available repository has specific objectives and foci that influence the types of programming they include, and this should be taken into account when selecting among them. For instance, when selecting databases for use in the Take Root Online CCA, primary consideration was given to ones that included a broad assortment of EBPs for parents and toddlers, as opposed to repositories focused more narrowly on a particular type of program (e.g., home visitation programs). Furthermore, the role of experiential knowledge should not be overlooked. In the case study presented here, only one program came through the suggestion of a content expert as opposed to the repositories, but others may find that greater reliance on content experts provides a richer set of programs to include. The goal should be ensuring that, regardless of the initial source of identification, the programs included in the CCA align with the intent of the program in development and have at least some evidence of effectiveness.

Finally, the common components approach presented here is meant to be informative more than prescriptive. The process of learning from and refining this approach is a priority for the Clearinghouse researchers as it is not considered a static program development methodology. For example, the use of CCA in the development of Take Root Online focused on a qualitative approach to reaching consensus in the identification and refinement of common content components. While this is a useful practice, and one that is likely more feasible for practitioners to do, the THRIVE team plans to incorporate more quantitative mechanisms (e.g., inter rater reliability checks) into the processes described within this paper while still preserving the qualitative features. Ultimately, the THRIVE team's goal is to produce programs that stand the best chance of making significant contributions to individuals and families. Using a common components approach is an innovative and practical tool for accomplishing that goal.

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Declarations of interest

None.

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