GLOBAL IMPLEMENTATION CONFERENCE

Common Component Analysis, Common Elements Methodology, and Collaborative Design in Research

Daniel F. Perkins, PhD
Clearinghouse for Military Family Readiness, Pennsylvania State University

Benedicte Kirkøen, PhD
Regional Centre for Child and Adolescent Mental Health, Norway

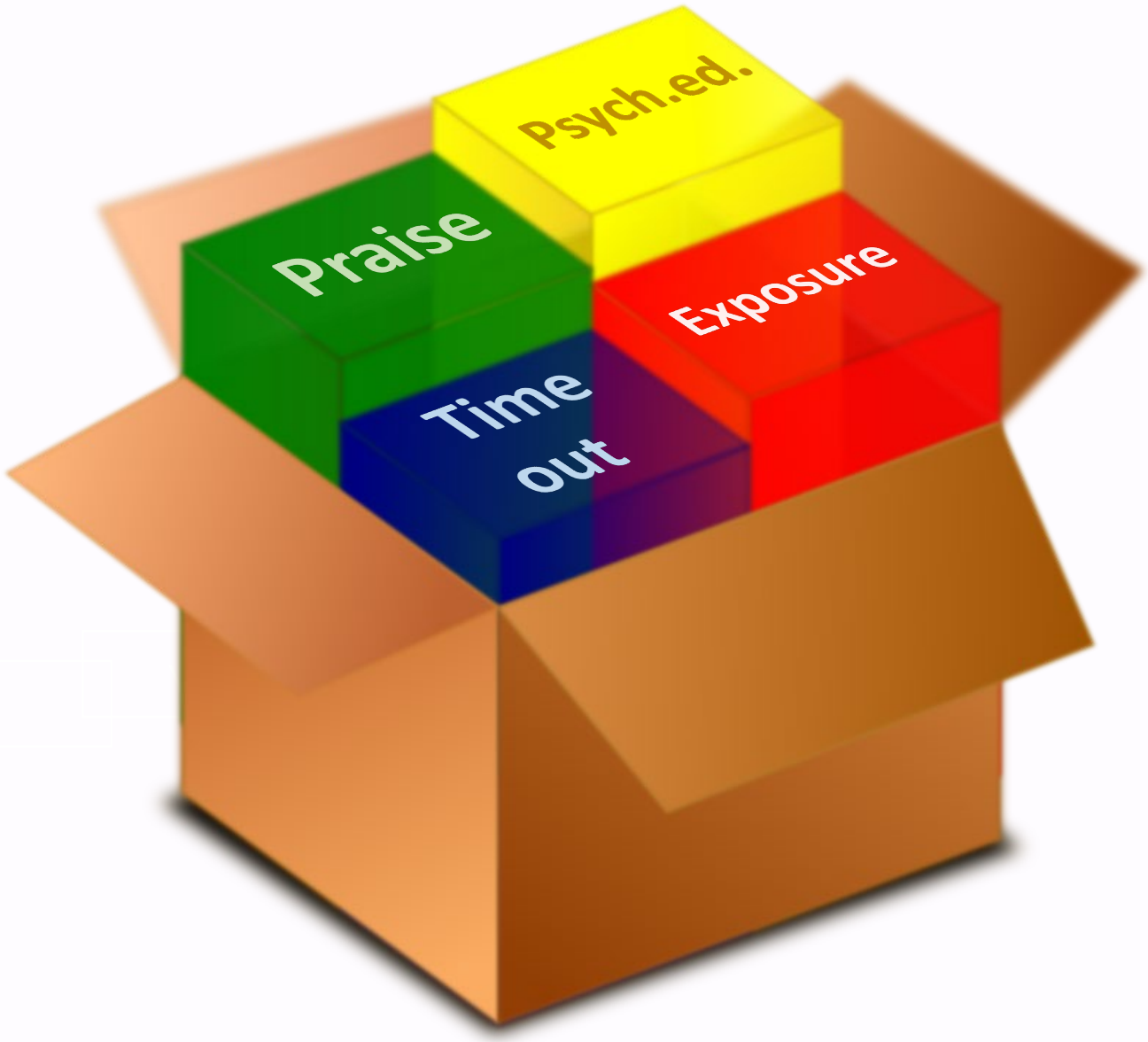
Thomas Engell, PhD student
Regional Centre for Child and Adolescent Mental Health, Norway

CLEARINGHOUSE FOR MILITARY FAMILY READINESS

Regional Centre for Child and Adolescent Mental Health

Eastern and Southern Norway

Program elements and components



GIC

What are common elements/components?

Intervention or program ingredients that are shared across programs and are related to behavioral change

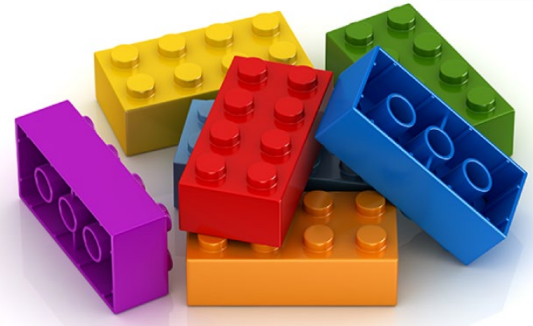
e.g. problem solving

Intervention or program content that is frequently shared by a selection of interventions.

e.g. positive reinforcement

Intervention/Program A

Intervention/Program B



Common elements

Intervention/Program C

Intervention/Program D

What types of elements/components?

Categorization 1: Perkins

- **Content:** what does the program teach or what information does it provide?
  e.g. coping skills, problem solving
- **Process**: how does the program convey information or teach skills?
  e.g. mode/method of delivery (online, face-to-face, coaching)
- **Barrier reduction**: does the program provide tangible supports or does it reduce barriers to accessing the program?
  E.g. monetary support, transportation
- **Sustainability**: how does the program keep participants engaged once formal programming has ended?
  e.g. ongoing social support, referrals

What types of elements/components?

Categorization 2: Kirkøen & Engell

- **Practice elements:** ***What you do***
  Specific activities or actions used to evoke or influence an outcome
  e.g. goal setting, praise, or psychoeducation

- **Process elements:** ***How you do it***
  Describes how and under what circumstances the practice elements are delivered
  e.g. in group, at home visit, or using role play

- **Implementation elements:** ***What made you do it***
  Discrete strategies used to facilitate or enable the delivery of practice- and process elements (strategies adopted from Powell et al., 2015)
  e.g. ongoing training or audit and feedback

Defining intervention content qualities

Common elements/components

Intervention content that is frequently shared by a selection of interventions, but not necessarily empirically tested. E.g. positive reinforcement

Common factors

Attributes and qualities of a practitioner and a client, or the relationship between them, that contributes to favorable outcomes. E.g. therapeutic alliance

Core elements/components

Indispensable features of an intervention. Without this component, the intervention would be a different intervention. E.g. Foster parent training in TFCO

GIC

Defining intervention content qualities

Common elements/components

E.g. psychoeducation used in 20 out of 30 interventions for youth anxiety

Evidence based?

Evidence supported?

Kernels?

Active ingredients?

Transdiagnostic?

Potent?

Essential elements?

Principles of effectiveness?

How do we identify common element/components?

Two different approaches

Common Component Analysis

- Inspired by the Distillation and Matching procedure (Chorpita & Daleiden) and other previous research described by Kaminski (2008); Bernal et al. (1980); Westen et al. (2004)
- The coding system was developed by:
  - Reviewing the common components empirical literature to identify key content and process codes;
  - Utilizing a qualitative direct content analysis approach to add common components through a Multi-stage process for coding websites
    - Qualitative coding in NVivo software
    - Reconciliation and agreement by coders

Common elements matrices

- Inspired by the Distillation and Matching procedure (Chorpita & Daleiden)
- Systematic review of relevant PICOs
- Double-coding of included interventions in matrices
- Codes all information available (practice-, process-, implementation elements, study and context characteristics)
- Uses pragmatic **frequency based** algorithms to extract common elements and common combinations of elements
- Criteria can be tailored to purpose (effect sizes, "winning interventions", frequency in effective interventions accounted for in ineffective/harmful interventions)

(Engell, Hammerstrøm, Kirkøen, Kornør & Hagen, in review)

Multiple purposes

1. **Evaluation**

- Identify, study, and evaluate discrete components/elements of interventions and programs
- Increase utilization of evidence-based components/elements

2. **Innovation**

- Optimization and re-design of interventions/programs and implementation strategies drawn from evidence-informed components/element
- Development of new or refined interventions/programs and implementation strategies

3. **Dissemination and implementation**

Inform policy, service design, education and practice

GIC

CLEARINGHOUSE
FOR MILITARY FAMILY READINESS

Common Components Analysis: Application to Veteran-Utilized Program Evaluation and Beyond

Daniel F. Perkins, Ph.D.
Professor of Family and Youth Resiliency and Policy
Principal Scientist, Clearinghouse for Military Family Readiness
The Pennsylvania State University
PSU Team: Julia Bleser, Nicole Morgan, Keith Aronson

Outline of the Presentation

- TVMI Study Review
- Common Components Analysis
- Common Components Analysis --- Employment
- Common Components Analysis --- Mental Health & Social Isolation

The Veterans Metrics Initiative: Research Aims

Aim 1:

- Document veteran well-being in four key domains – (**mental and physical health**, **vocation**, **finances**, and **social relationships**) – over the first three years of the transition from military service to civilian life
- Identify factors associated with better and worse well-being

Aim 2:

- Describe programs used by veterans as they reintegrate into civilian life and distill them into their components, identifying common components across programs

Aim 3:

- Identify program components that are associated with changes in well-being following separation from military service

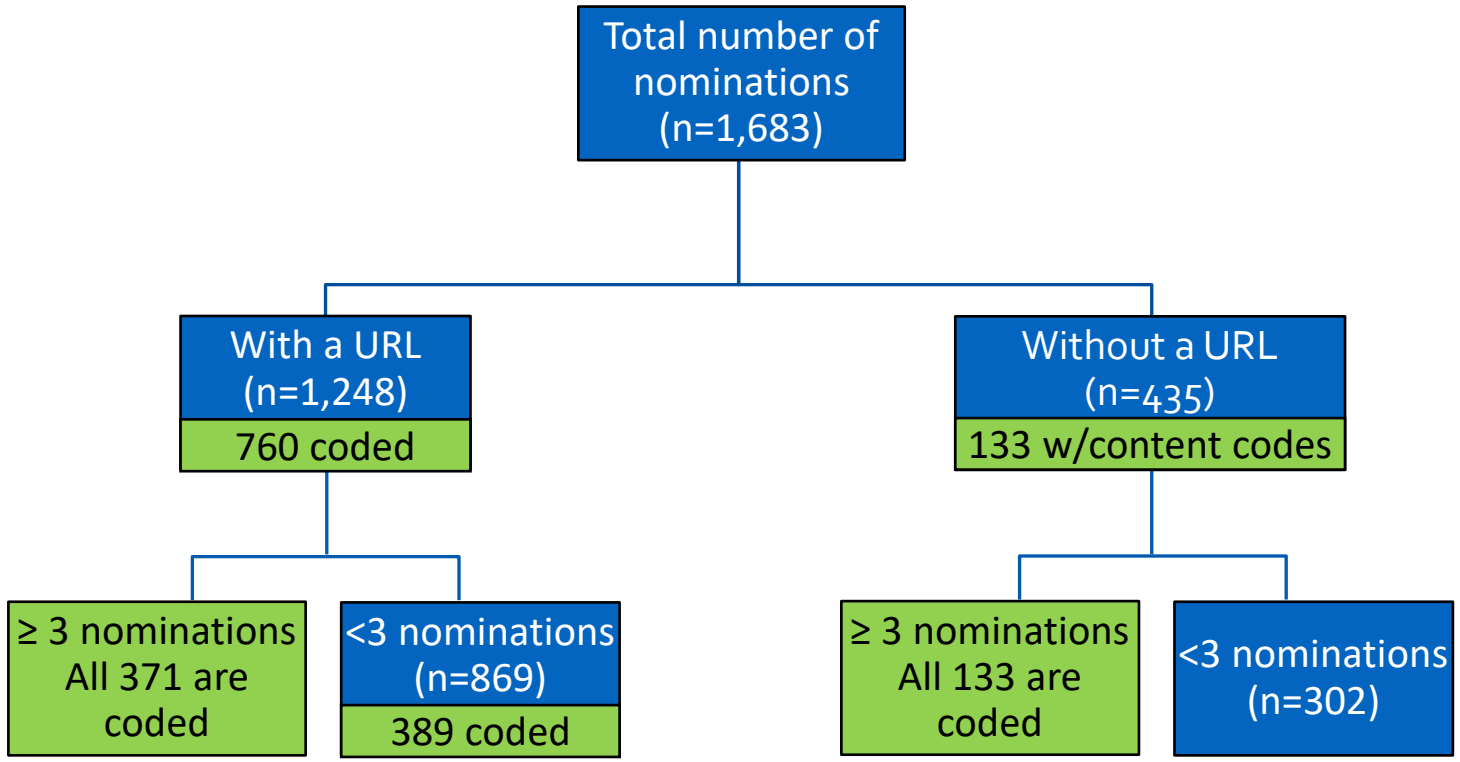
Identification of Common Components

- Three sources to triangulate data:
  - Veteran nomination
  - Program website
    - Including annual reports, if available
  - Interview of key program staff
- Same questions are asked across our 5 well-being domains (employment, education, financial, health, and social

Examples of Common Components

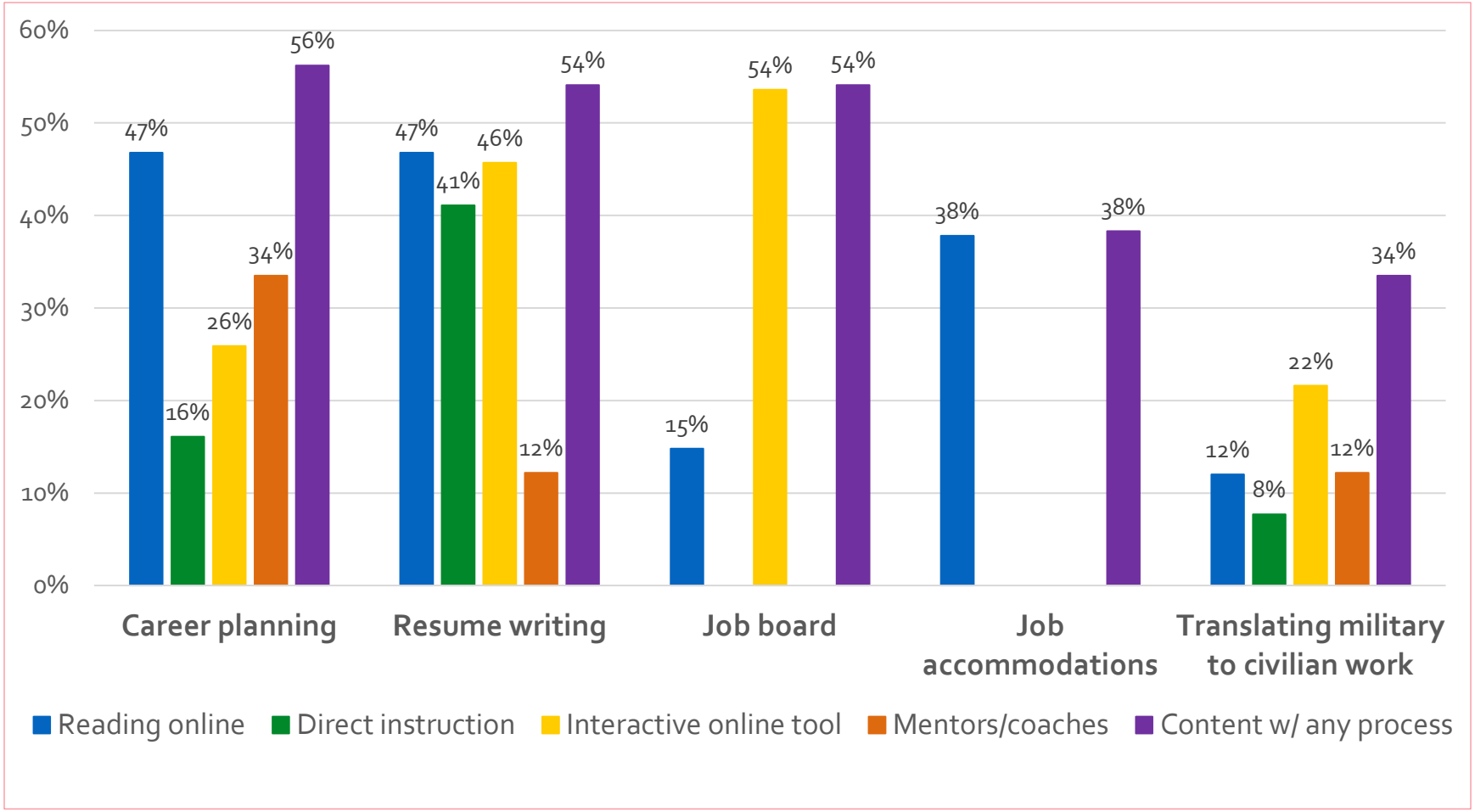
- **Content Components:**
  - Coping skills
  - Information on how to… write a resume, apply for a job, search availability of jobs
  - Problem-solving
- **Process Components:**
  - Mode of delivery: online, phone, and face-to-face
  - Method of delivery: direct instruction, coaching/ mentoring, peer to peer interaction, homework, discussion
- **Barrier reduction:** Providing monetary or tangible support, providing access to the program (transportation), reducing stigma
- **Sustainability:** Ongoing social support groups, community support, referrals

Wave 1 Program Nominations

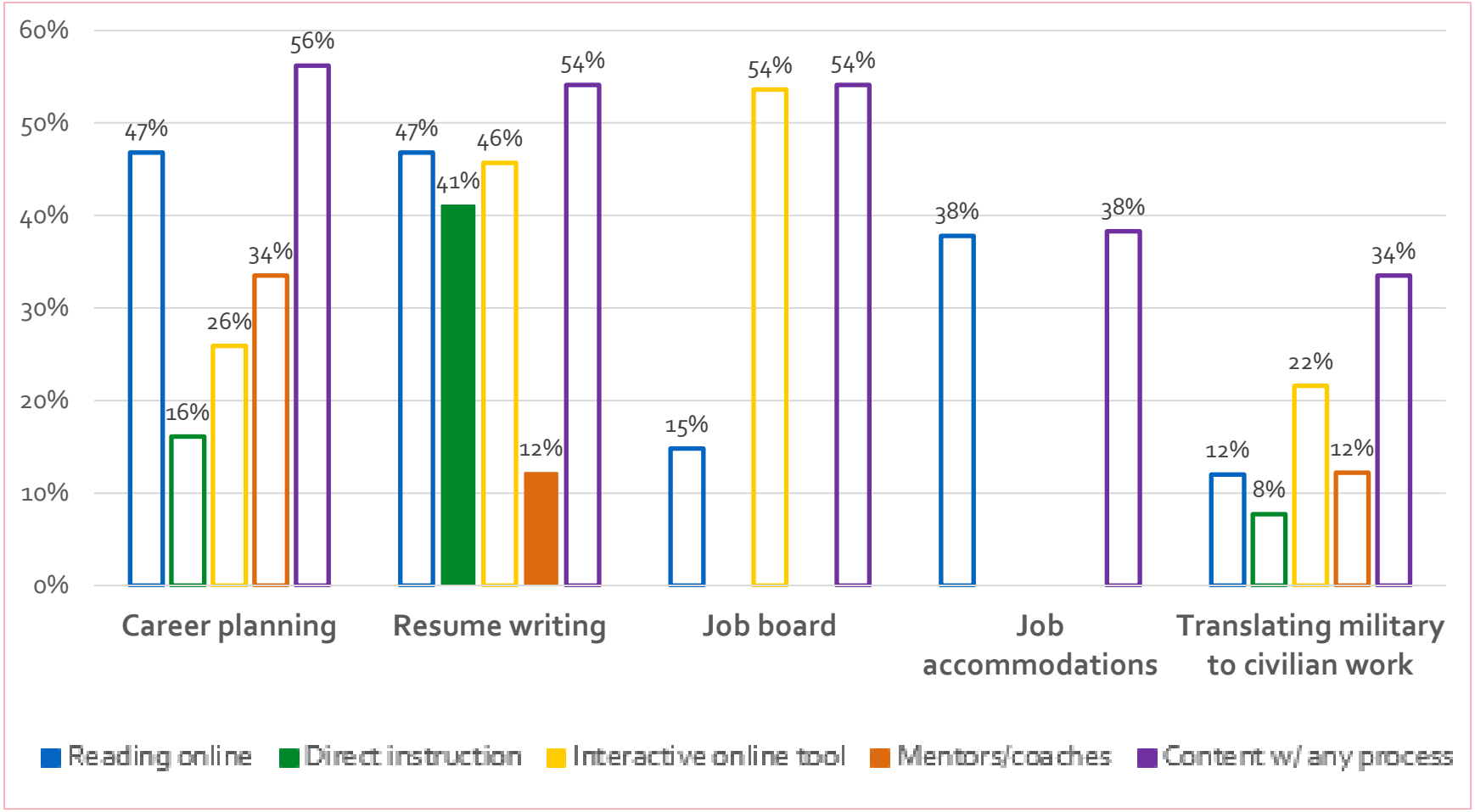


- 71% of Veterans have all of their program nominations coded
- 97.7% of Veterans that nominated a program from wave 1 have at least 1 program coded

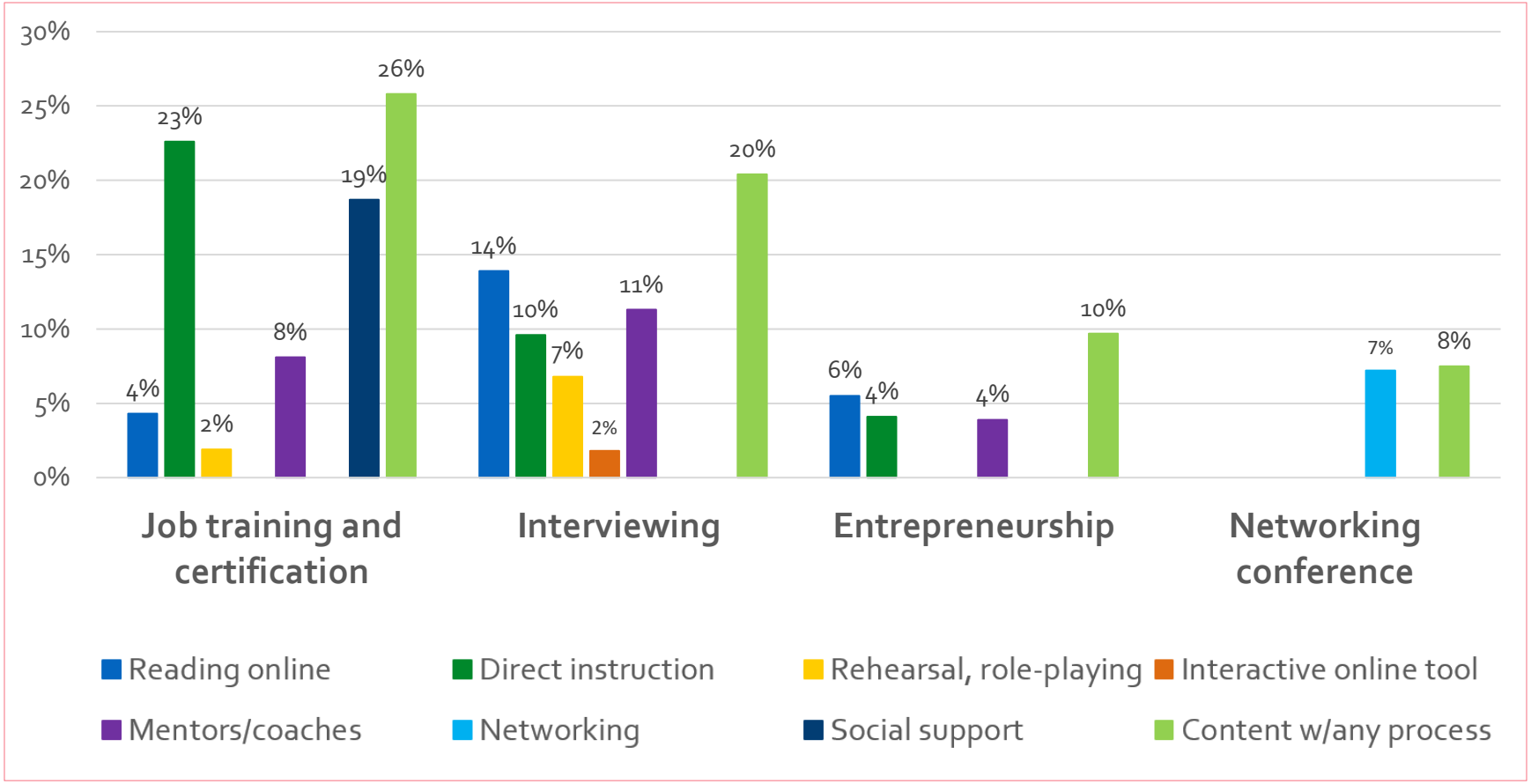
Wave 1 Employment Content & Process Components



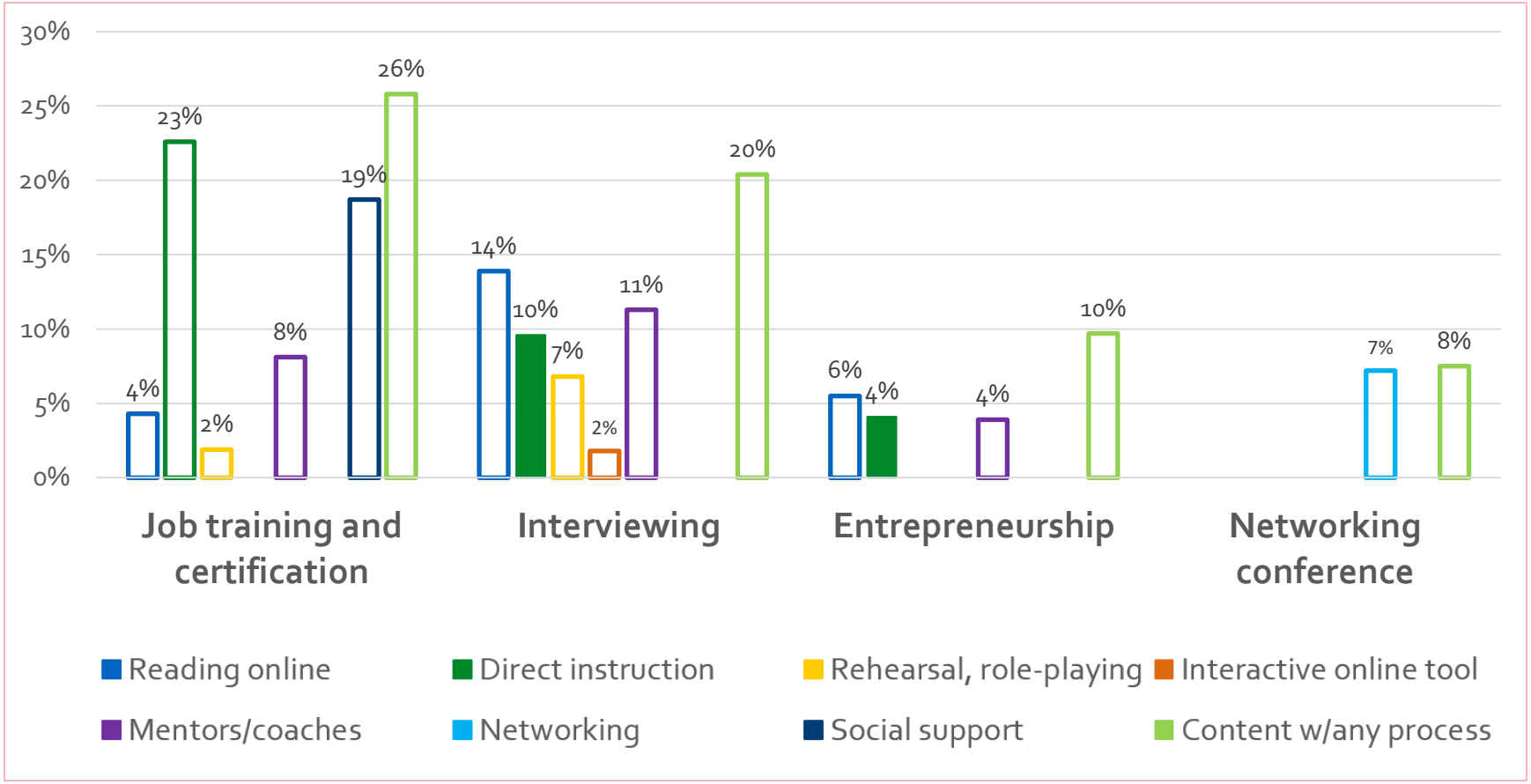
68% (n=1,135) Of Veterans Who Were Looking for a Job in W1 Found a Job in W3



Wave 1 Employment Content & Process Components



68% (n=1,135) Of Veterans Who Were Looking for a Job in W1 Found a Job in W3



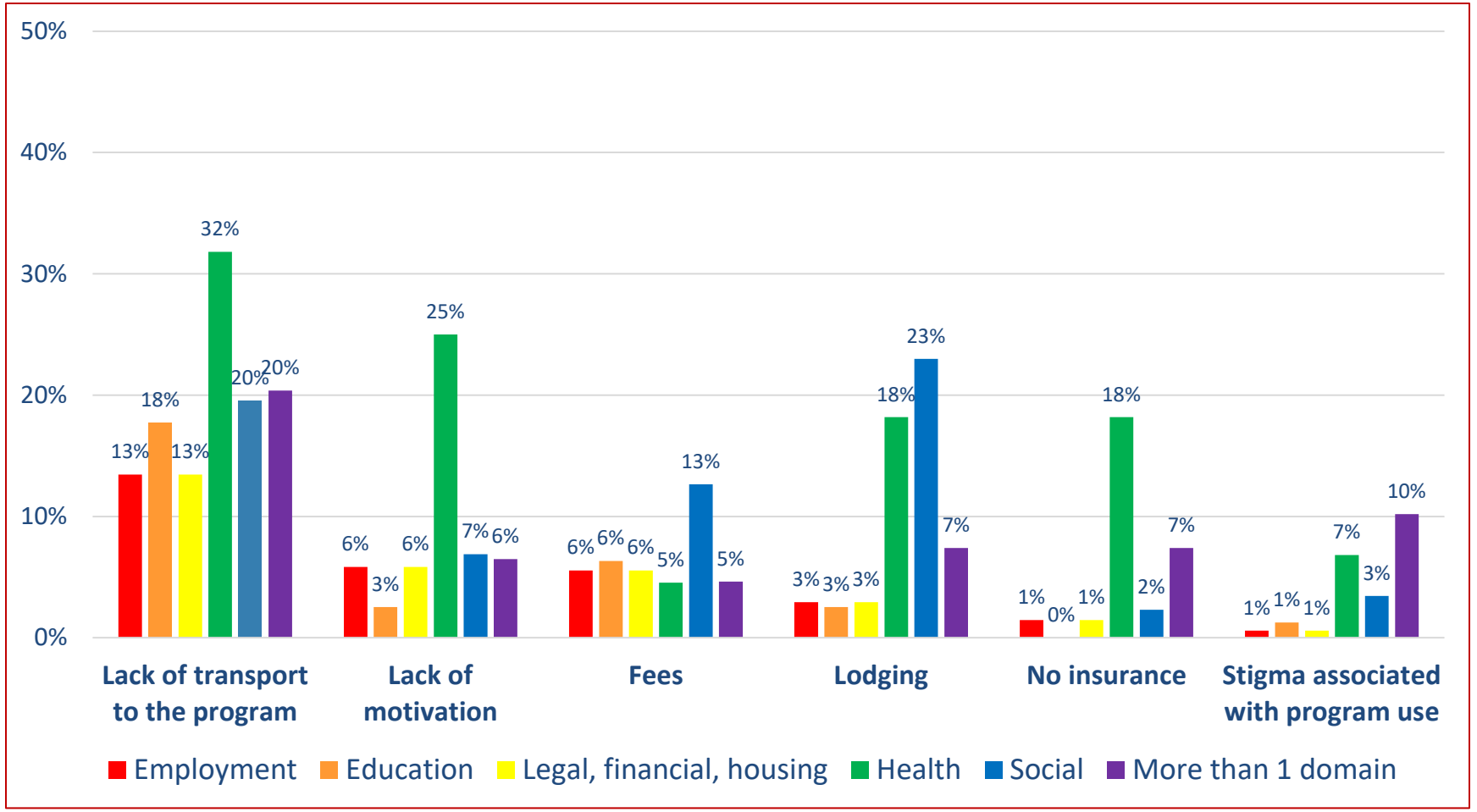
Social Isolation and Program Components

Veterans who were socially isolated at Wave 1 but reported volunteering at Wave 2 were less likely to feel socially isolated at Wave 2.

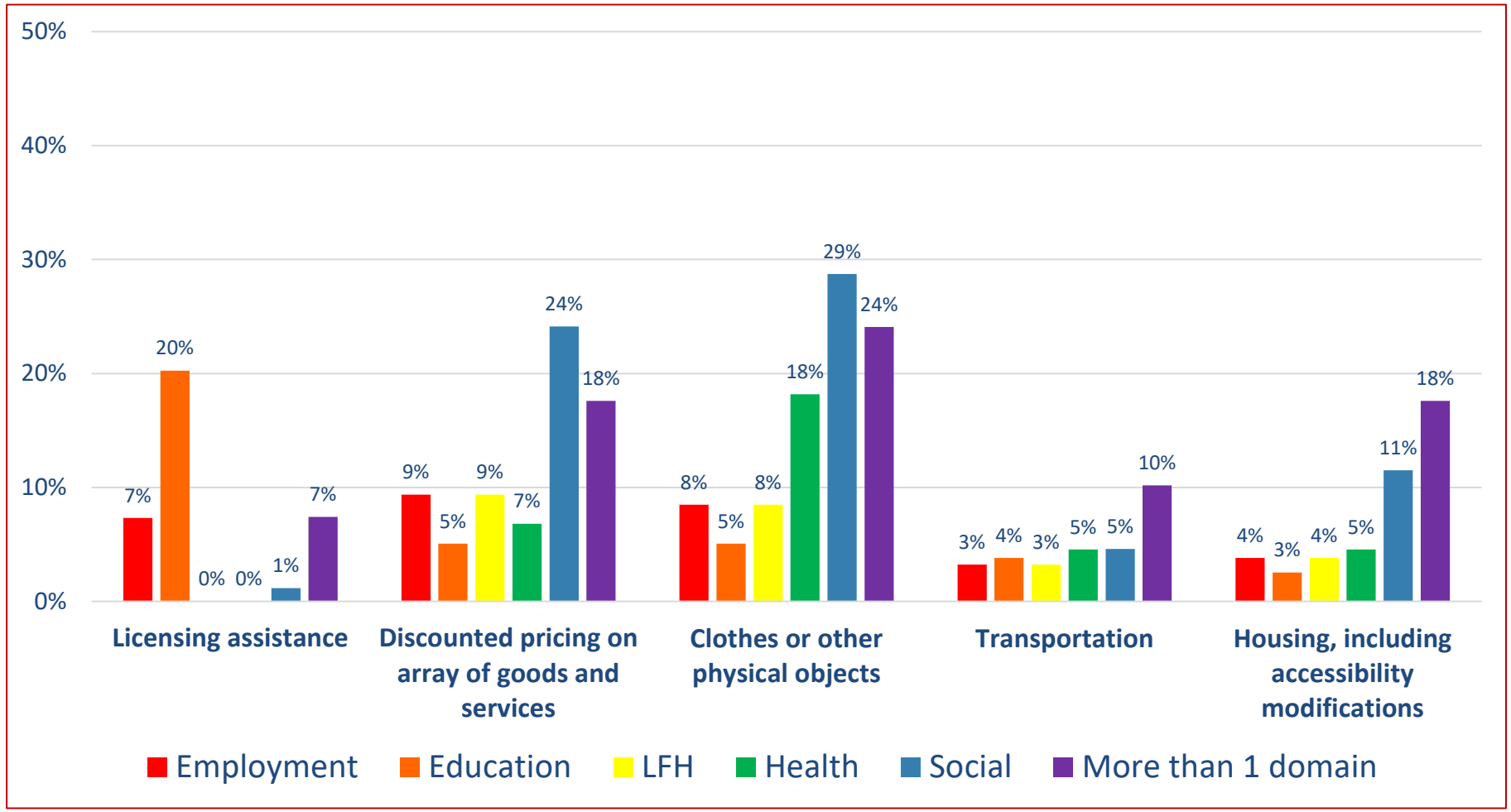
Social Isolation and Program Components

Veterans who were socially isolated at Wave 1 but reported regularly participating in a community group that shares similar hobbies at Wave 2 were less likely to feel socially isolated at Wave 2.

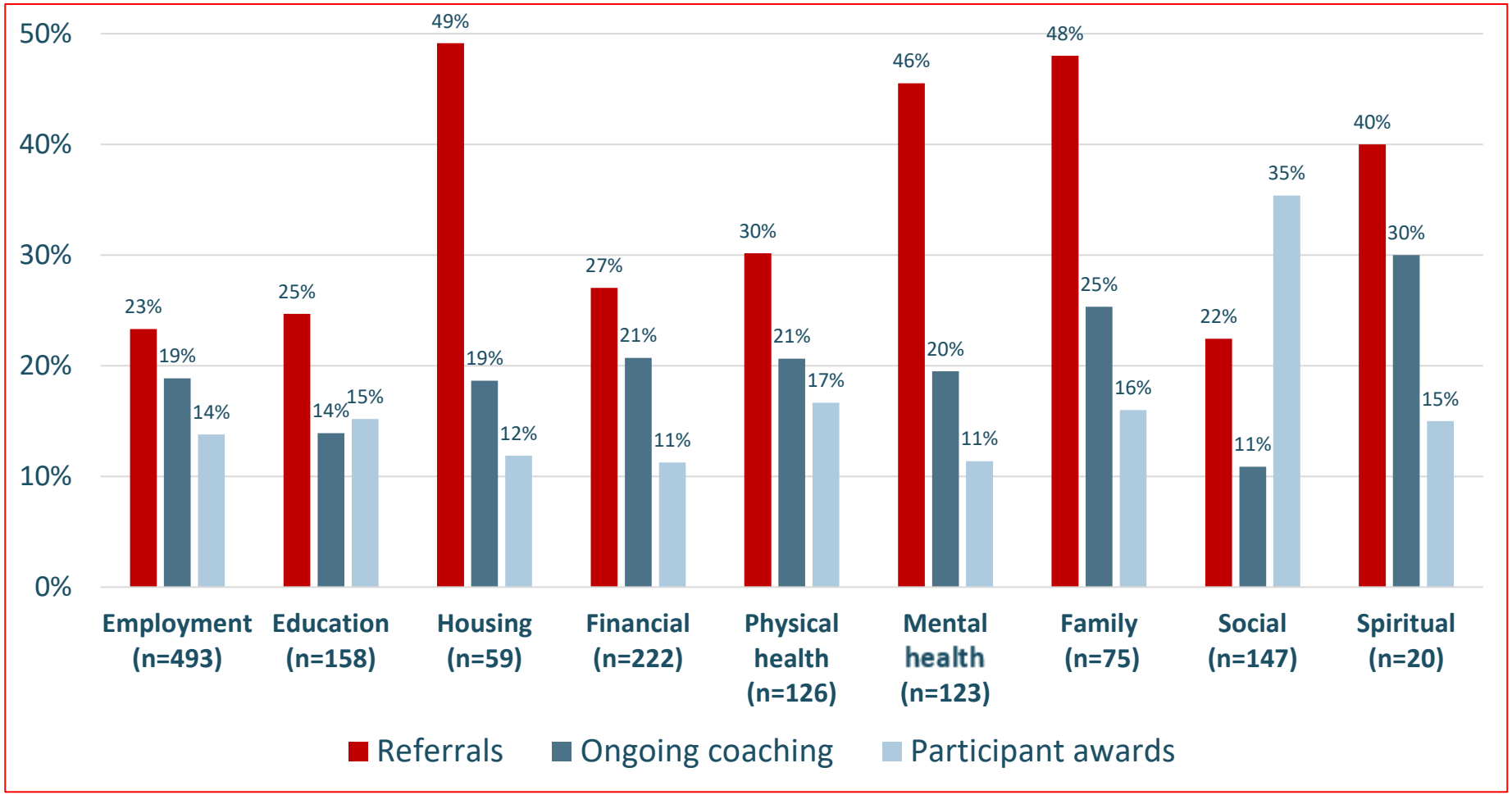
Waves 1, 2, and 3 Components that Increase Program Access



Waves 1, 2, and 3 Components that Provide Tangible Supports



Waves 1, 2, and 3 Components that Improve Sustainability



GLOBAL IMPLEMENTATION CONFERENCE

Combining common elements with collaborative intervention- and implementation design

Thomas Engell, PhD student
Regional Center for Child and Adolescent Mental health, Norway

Benedicte Kirkøen, PhD
Regional Center for Child and Adolescent Mental health, Norway

Regional Centre for Child and Adolescent Mental Health

Eastern and Southern Norway

Thomas.engell@r-bup.no @ThomasPatos

RBUP

The KOBA-STUDY

INTEGRATED KNOWLEDGE TRANSLATION IN CHILD WELFARE

IMPROVING EDUCATIONAL OUTCOMES FOR CHILDREN AT RISK

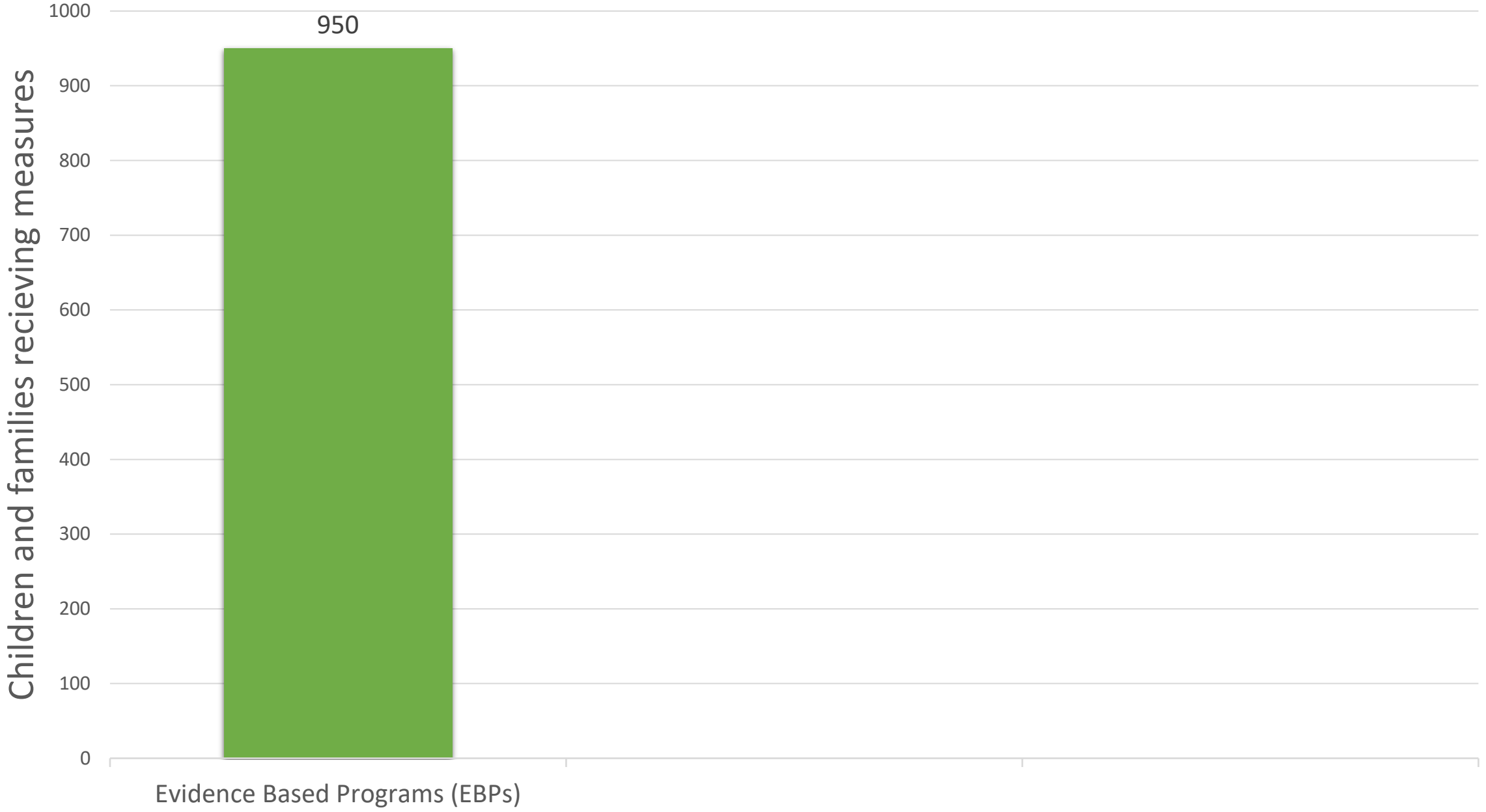
- Hybrid type 2 pragmatic RCT evaluating:
  - Integrated Knowledge Translation
  - Enhanced Academic Support (new intervention)
- Three child welfare sites in Norway
- Primary school children and their families

Engell, T. Follestad, I. B. Andersen, A. & Hagen, K. A. (2018). *Trials*, *19*(1), 714.

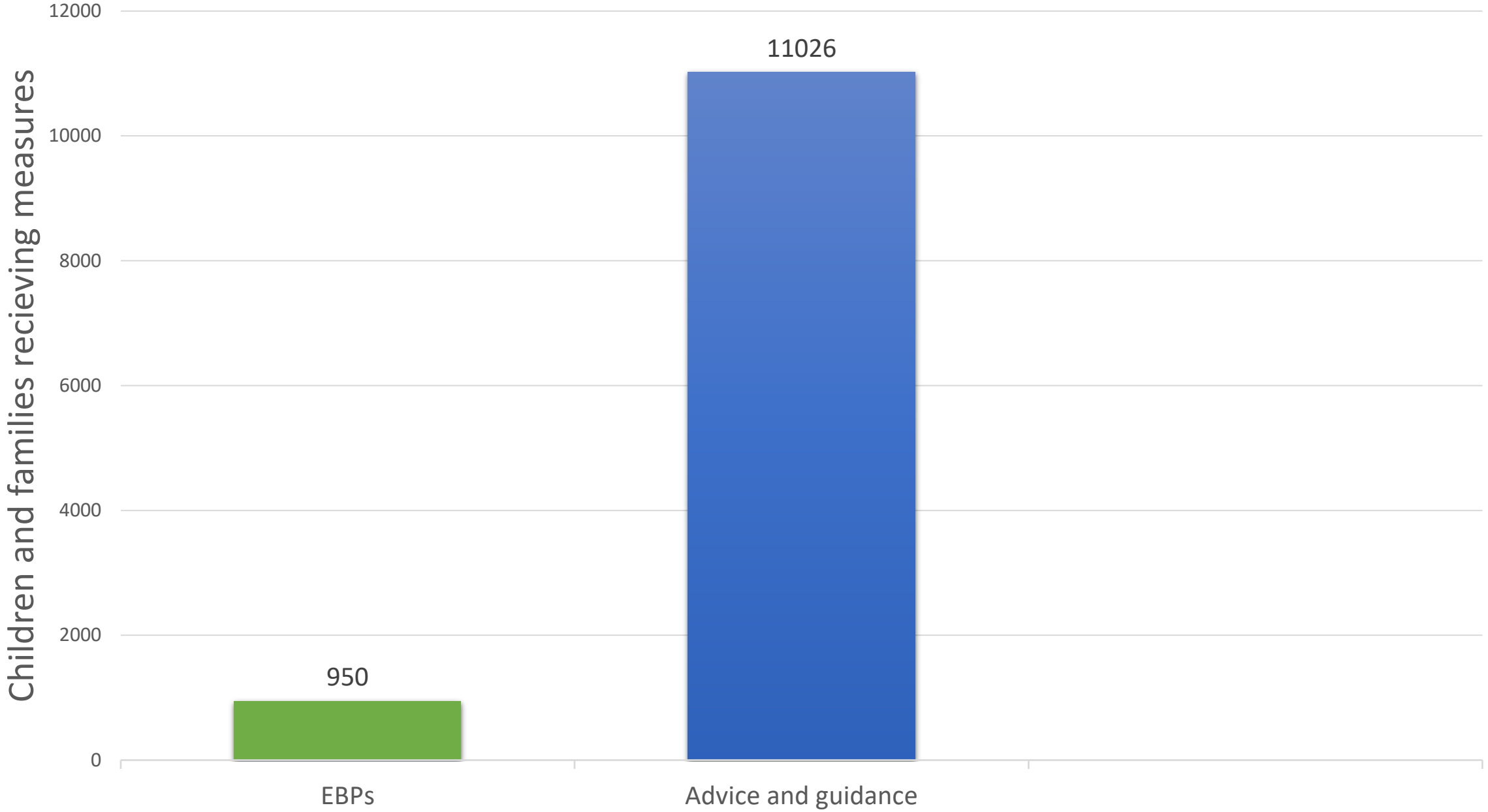
Children in child welfare services and academic achievement

- Only 2 in 10 complete secondary school on schedule
- Pressing need for effective academic support for children in child welfare
- Review of evidence-based programs (EBPs)

EBPs in Norwegian child welfare services

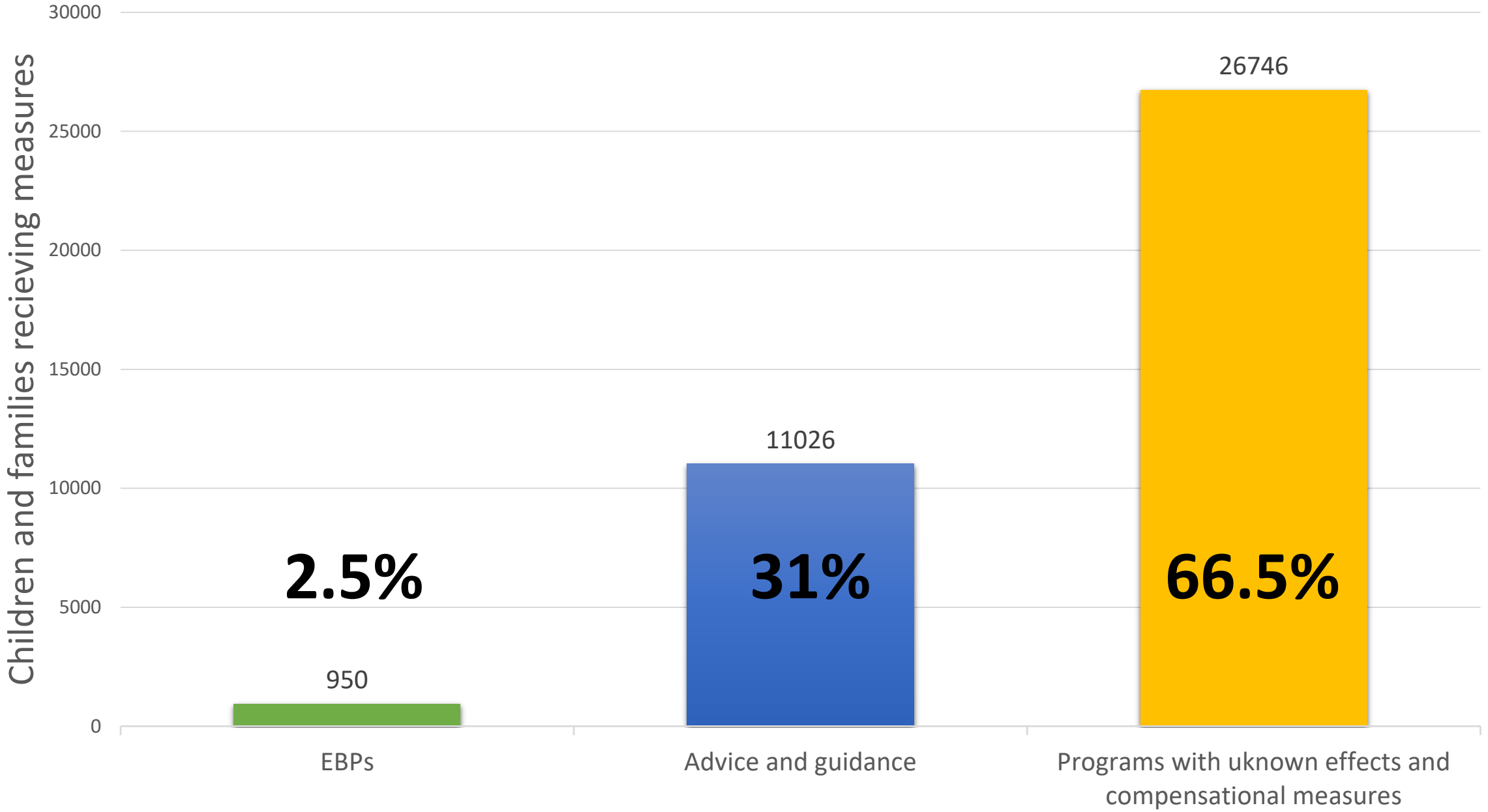


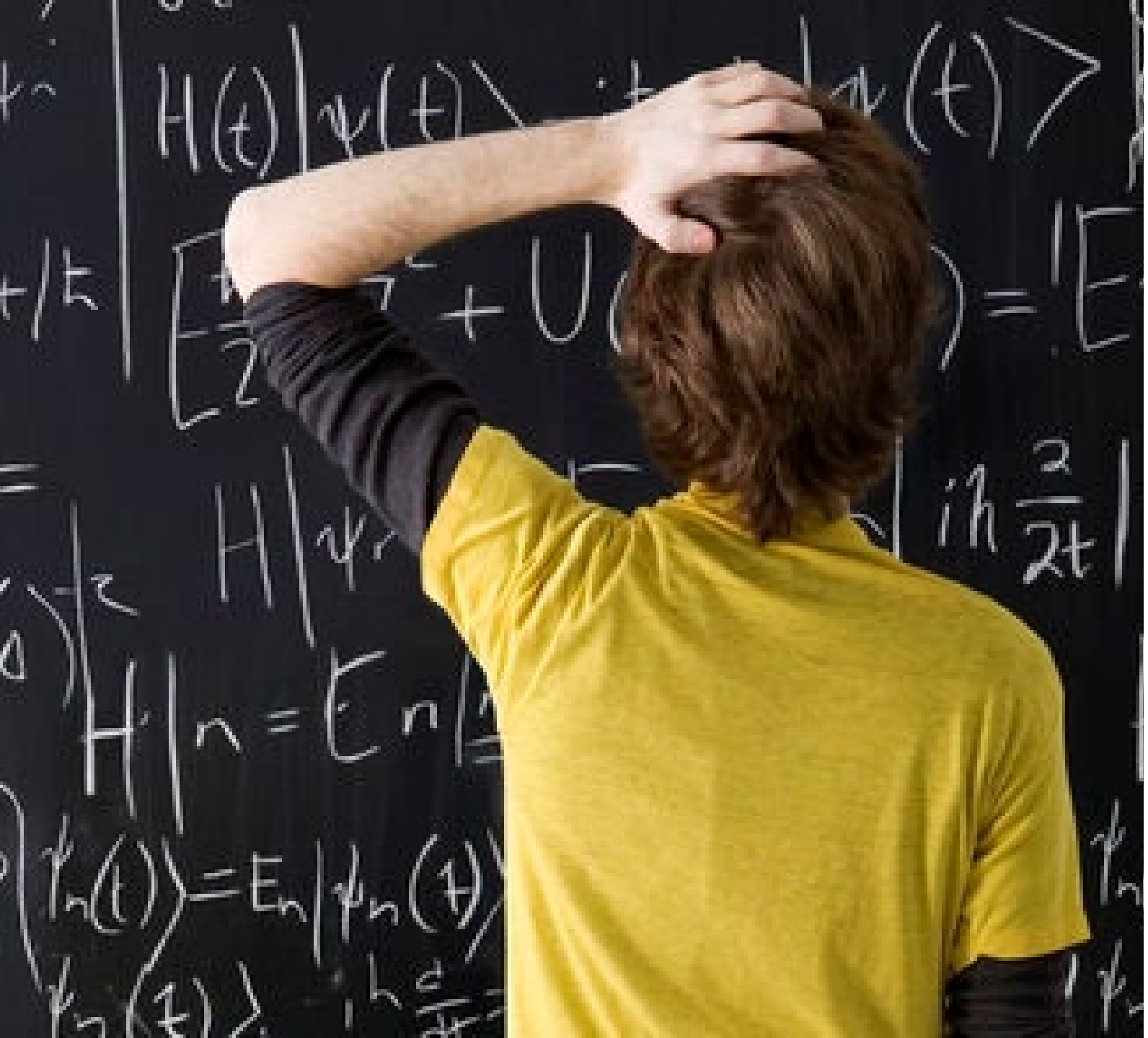
Reach of EBPs in child welfare services



Reach of EBPs in child welfare services

Christiansen et al., 2015





Academic support in general child protection practice

- **Challenging implementation climate and readiness for change**
  - More tenure as practitioners = lower perceived readiness and implementation climate ($p < .01$)
- **Lack of feasible EBPs**
- **What do we do?**

(Engell & Hagen, in prep)

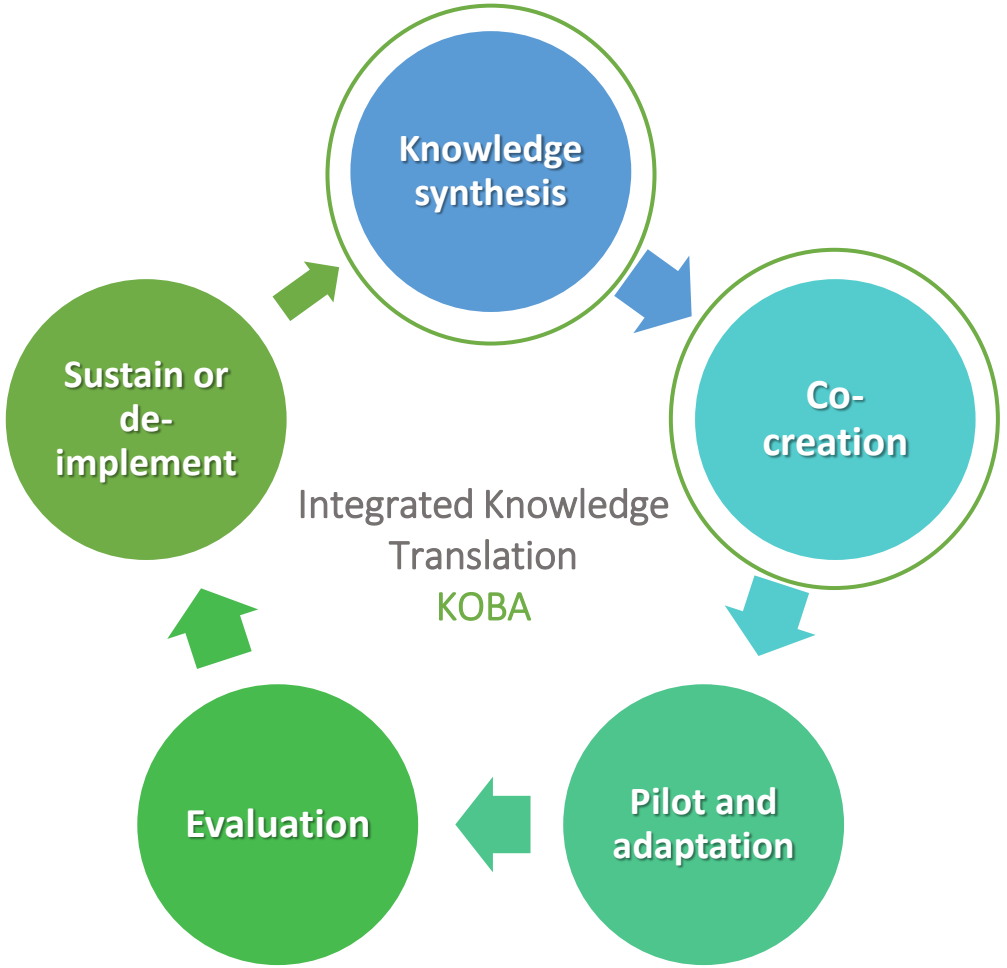
Common elements analyses

+

Co-creation

=

Promote implementability



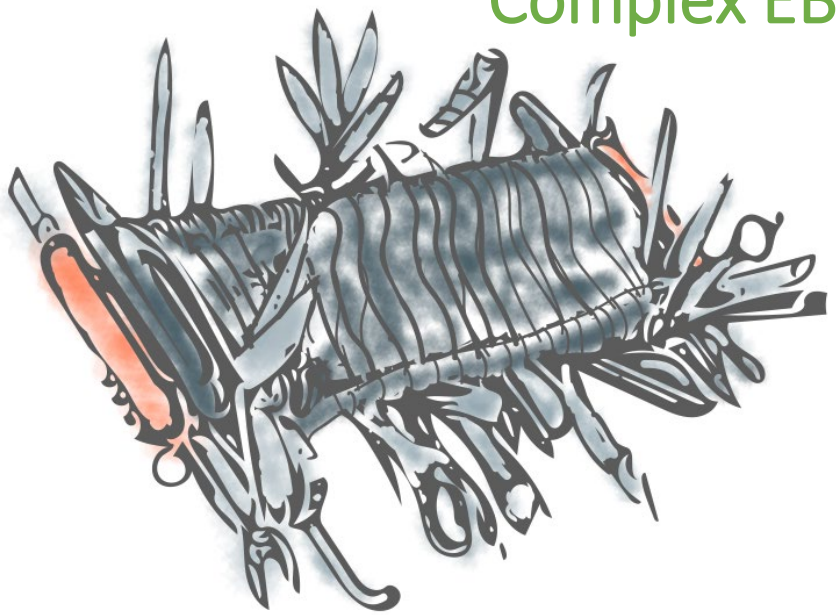
Today: pre-lim results on fidelity and implementability

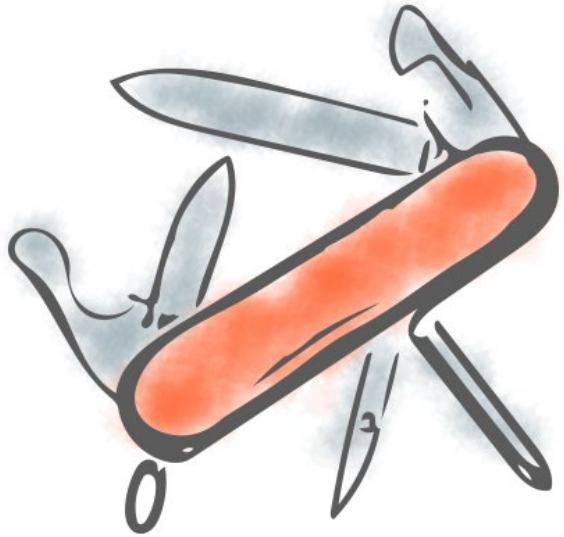
Thomas.engell@r-bup.no @ThomasPatos

(Graham et al 2014; Engell et al 2018)

Reduce complexity to promote implementability?

Complex EBPs



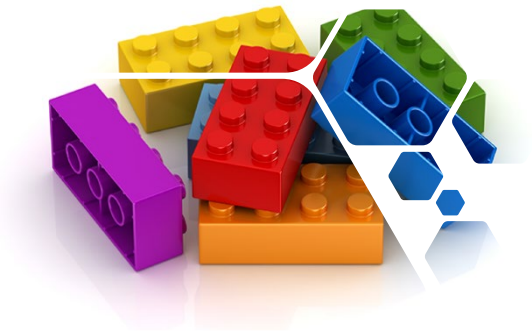


Necessary elements?

(Lyon, 2018)

Thomas.engell@r-bup.no @ThomasPatos RBUP

What do we learn from common elements analyses?



What practice element are most commonly used
e.g. parent training in positive reinforcement…

How most commonly delivered (process elements)
e.g. home visitation, role play, once a week…

In combination with what other elements
e.g. psychoeducation, feedback, group training..

For what outcomes
e.g. academic achievement, conduct problems..

For whom
e.g. age, gender, type of risk..

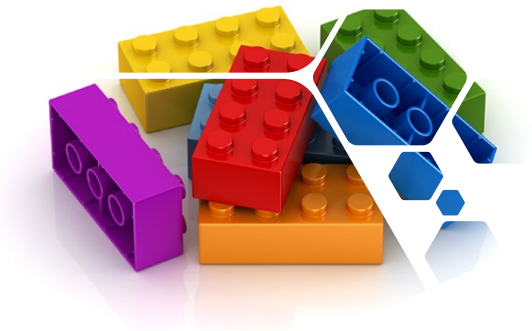
How most often implemented
e.g. educational meetings, using ongoing coaching..

Effectiveness criteria
e.g. inclusion in effective vs ineffective or harmful studies..

Design and re-design of interventions and implementation strategies using common elements

Possibilities:

- Discrete and flexible
- Integrate with other interventions and implementations
- Tailoring to individual and contextual needs
- Remove unnecessary elements
- Add potent elements
- Inform adaptations
- Cross-domain/transdiagnostic elements?



Increased:

Appropriateness?

Acceptability?

Feasibility?

Usability?

=

Enhanced implementability?

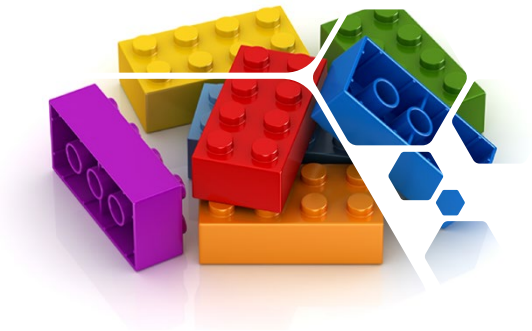
Promote adoption and sustainment?

Thomas.engell@r-bup.no @ThomasPatos RBUP

(Engell et al in review; Hogue et al 2017; Lyon & Koerner 2016; Proctor et al 2011)

Common elements of academic OSTA interventions

- Primary school children at risk
- Outside of school hours
- Randomized and non-random. controlled trials



Identification

Records identified through database searching (n = 11,704)

Additional records identified through other sources (n = 24)

Records after duplicates removed (n = 9,876)

Screening

Records screened (n = 9,876)

Records excluded (n = 9,520)

Eligibility

Full-text articles assessed for eligibility (n = 365)

Full-text articles excluded (n = 303)

Studies assessed for coding inclusion (n = 50, published in 61 papers)

Included

Studies included for coding (n = 36)

Studies with significant effect on one or more outcomes (n = 30)

Studies with no effect on any outcomes (n = 6)

29 articles, 5 dissertations, 3 evaluation reports, 7 intervention manuals

62 practice elements
49 process elements
36 implementation elements

Thomas.engell@r-bup.no @ThomasPatos RBUP

Common practice elements *Definitions*	Frequency counts						Elements used in combinations with common practice elements		
	Reading (29 studies)		Math (8 studies)		GPA (6 studies)		**Process elements** (FV[d])	**Implementation elements** (FV)	**Practice elements** (FV)
	+*	÷**	+	÷	+	÷			
Positive reinforcement *Use of positive responses (1) or incentives (2) to welcomed behaviors or performances*	11	1	4		2	1	• Delivered by caregiver (13) • 1on1 delivery (12) • Use of rewards or incentives (11) • Regular support to deliverer (11) • Delivered at home (11) • Multi-element (9)	• Quality monitoring (11) • Provide ongoing consultation (9) • Distribute educational materials (7) • Remind practitioners (5) • Conduct educational meetings (5) • Involve end-users (4)	• Parental school involvement at home (10) • Homework support (8) • Correction and feedback (7) • Monitor performance (7) • Structured tutoring (7)
	FV=10 (*n* = 771)		**FV=4** (*n* = 331)		**FV=1** (*n* = 100)				
Training in parental school involvement at home *Training or guidance in any form of engagement by caregivers to support a child academically at home*	10		2		3		• Received by caregiver (14) • Delivered by professional (13) • Regularly support to receiver (12) • Use of organizational material (11) • Use of educational material (10)	• Quality monitoring (13) • Distribute educational materials (12) • Provide ongoing consultation (8) • Remind practitioners (5) • Clinical supervision (4) • Conduct ongoing training (4)	• Homework support (11) • Psychoeducation (10) • Use of positive reinforcement (9) • Use of incentives/rewards (8) • Structured tutoring (8)
	FV=10 (n = 1194)		FV=2 (n = 177)		FV=3 (n = 56)				

[a] Frequency count value (FV) = frequency of the practice elements' inclusion in effective interventions (+1) accounted for inclusion in ineffective interventions (-1)

[c] Total amount of participants in the studies where the practice element was used in an intervention

[d] The frequency count value of process elements used in combination with the practice element in effective interventions (+1) accounted for in ineffective interventions (-1)

Co-creation

Facilitated teams with practitioners, stakeholders and former clients to exchange knowledge and co-create:

- Common language exercise
  - Create glossary of key terms
  - Education in key concepts
- Tailor common elements into *implementable* evidence-supported intervention
  - Based on common elements
  - Feasible, appropriate, acceptable, usable
- Develop implementation blueprint
  - Based on readiness assessments
  - Using implementation strategy tool
- Tailor pragmatic evaluation design
  - High external validity

KOBA

Enhanced Academic Support

Locally tailored lean and flexible intervention

- 4 core elements (based on common elements)
  1. Positive parental involvement in school
  2. Structured tutoring in reading and math
  3. Homework structure and routines
  4. Positive reinforcement, praise and feedback
- Flexible integration in general practice
- Primary school children and their families after school
- 14 hour dynamic training program
- Pragmatic practitioner-handbook

(Engell, Follestad, Andersen, Hagen 2018)

KOBA

Enhanced Academic Support

Locally tailored lean and flexible intervention

Flexibility within fidelity:

- A basic structure with individual tailoring encouraged (e.g. reorder, combine, reduce, augment)
- Pre-defined adaptation alternatives
- Eclectic adaptations encouraged if necessary
- Dynamic double-informant fidelity monitoring

- Dose
- Sequence
- Adherence
- Competence
- Adaptations
- User-involvement
- Satisfaction

(Engell, Follestad, Andersen, Hagen 2018)

Co-created implementation strategies

Implementation strategy	How	Implementation quality	Interview quotes
Make intervention dynamic and flexible	Enable and monitor flexible use of core elements, predefined adaptations, and eclectic adaptations	☺ Good all sites	"I would say the flexibility has been the most important.. Basing it on needs.. having the structure as a foundation, but still stepping out of it and finding other solutions"
Use continuous support	Bimonthly outreach visits, booster session every 6 months, continuous telephone support	😐 Good site 1 Moderate site 2 Poor site 3	"Even though it's quite elementary to us, just repeating the elements from time to time helped, and to discuss issues" **"What is a booster?"**
Use ongoing coaching	Bimonthly group coaching from implementation team. Individual coaching on request or in case of drift	☹ Variable fidelity to group coaching, voluntary individual coaching failed	"I am thrilled with the coaching, I feel I get everything I need. I just call, and they deliver." "I think I could have been more active in reaching out to them"

Other strategies: use champions, audit and feedback, develop contingency plans, use educational material (Engell et al., 2018)

Enhanced Academic Support

Locally tailored lean and flexible intervention

Is it implementable?

Intervention Appropriateness Measure (IAM)

Percieved fit, relevance or compatibility in context

Acceptability of Intervention measure (AIM)

Agreeableness with practitioners

Feasibility of Intervention measure (FIM)

Is it doable given context and circumstances

Weiner et al 2017

Intervention Usability Scale Lyon & Koerner, 2016

can be used by specified users with effectiveness, efficiency, and satisfaction in a specified context

Focus groups interviews

Convergence and expansion on quant. data

Implementability Enhanced Academic Support

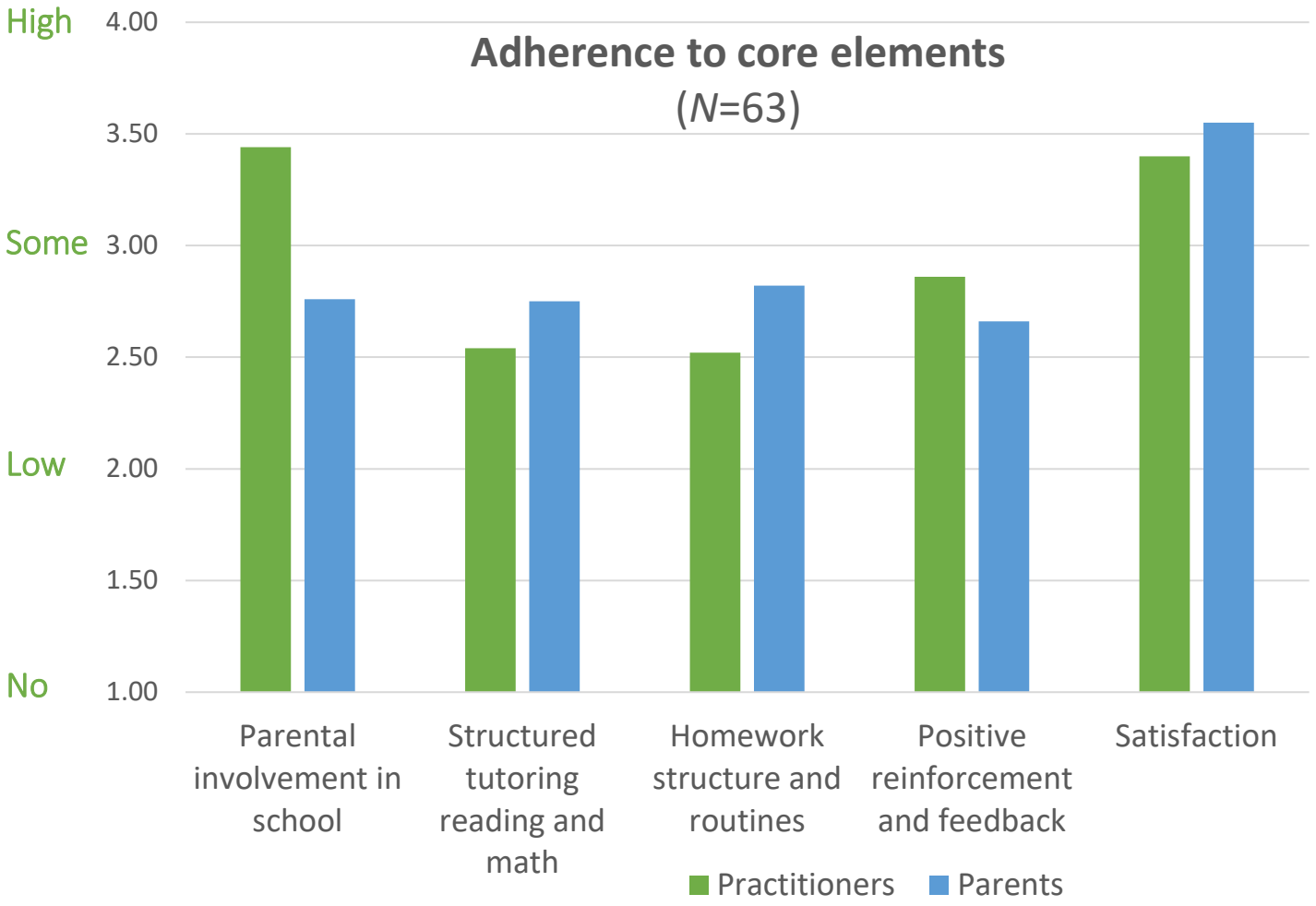
	Quantitative (*N*=22)	Qualitative (*N*=4)
Feasibility (0-20)	15.59 (SD=2.97)	• *"Enhanced academic support has become a part of my practice, with the core elements… that nicely implements into working more general* • *"[Without the research study] I doubt I would have used it as described in the handbook, but I would definitely use elements"*
Acceptability (0-20)	16.50 (SD=3.84)	• *"We have thrown ourselves into something new and exciting, but sort of, I think it's strange that there is not more enthusiasm"* • *"Very important and useful" "Everyone should receive this, I have even used it with my own kids"*
Appropriateness (0-20)	14.14 (SD=4.63)	• *Sometimes the [familie's] problems are so comprehensive, so we cant just do academic support.. but we can use the elements alongside all way. I think thats the thing that makes it work.*
Usability (0-100)	64.49 (SD=17.32)	• *"For us the elements are easy to deliver, but they can be difficult for those we give them to"* • *"There is nothing difficult about it, you can just adapt to the family's needs and situations*

Fidelity Enhanced Academic Support

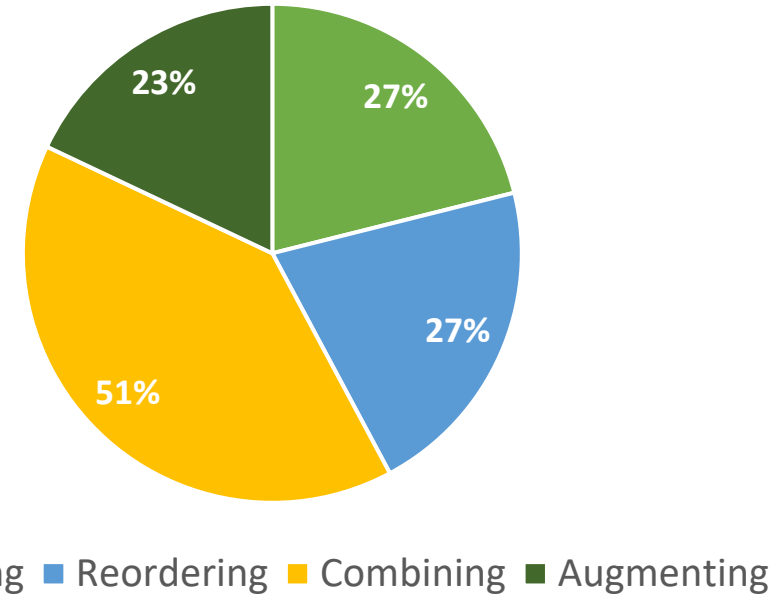
Average session duration

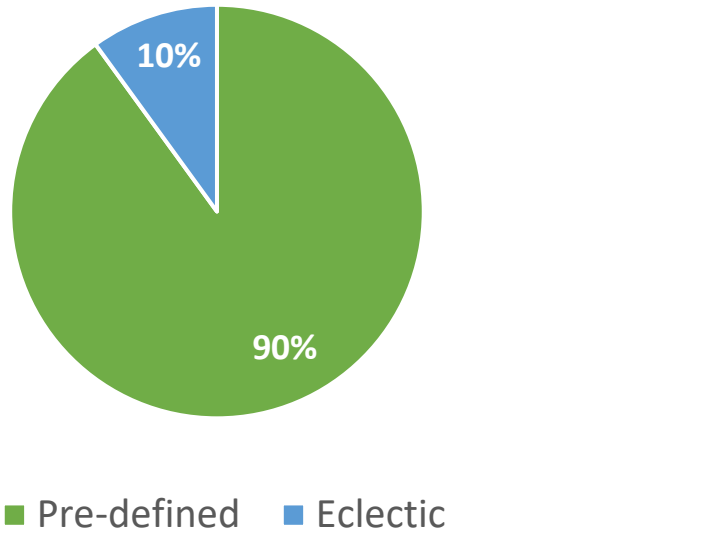
Practitioners: 39.8 (*SD*=18.1)

parents: 48.7 (*SD*=20.2)



Adaptations



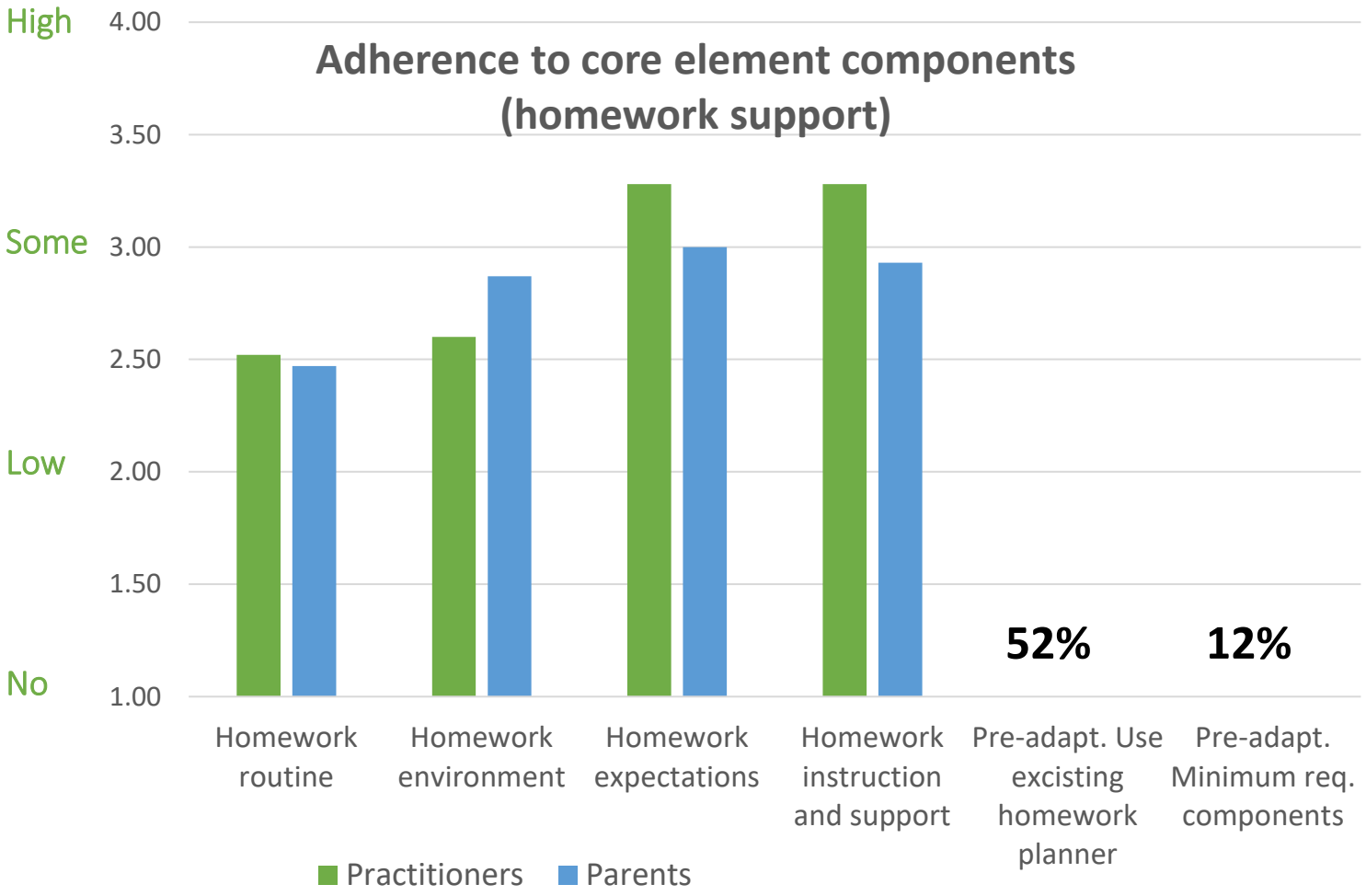


Fidelity Enhanced Academic Support

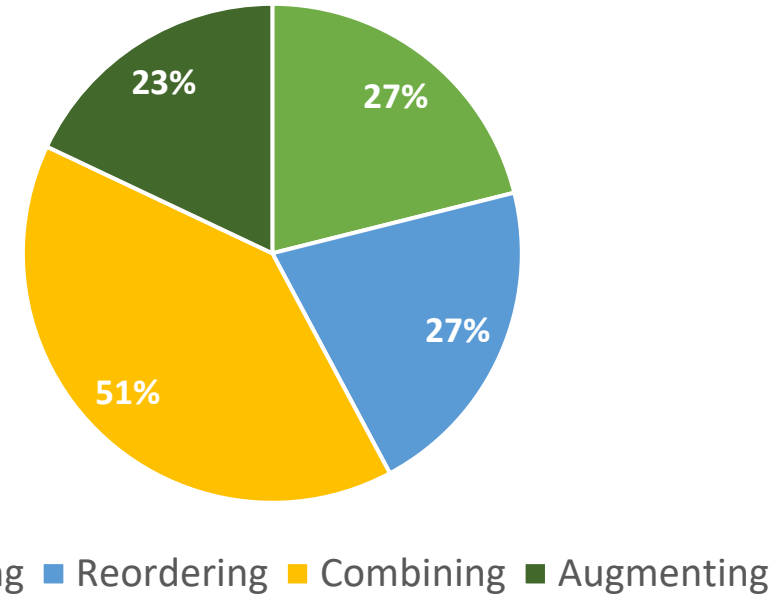
Average session duration

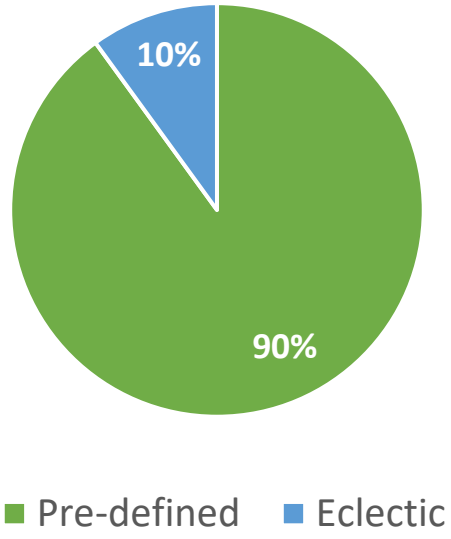
Practitioners: 39.8 (*SD*=18.1)

parents: 48.7 (*SD*=20.2)



Adaptations





Combining common elements and co-creation

Learnings so far:

1. Practitioners and user-reps key in co-creation
   - Tailoring to context
   - Appropriate adaptations
   - Should tailor how they contribute

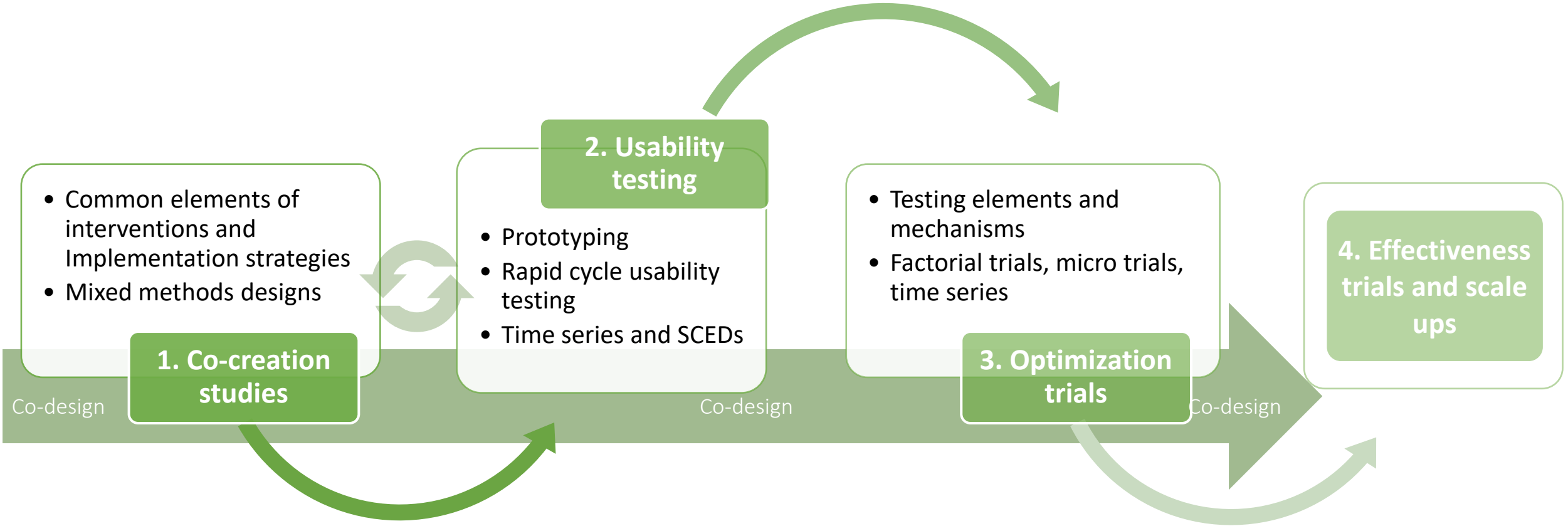
2. Be clear about what can and cannot be co-created

3. Intervention shows promising implementability
   - Flexibility and integration in current practice key
   - Too much flexibility?

Common Elements and co-creation 2.0

Projects

- **CORE Child Welfare** (Common elements of child maltreatment interventions)
- **CO-TEEN** (Brief transdiagnostic elements-based mental health intervention for adolescents at risk, targeting emotion regulation)



KOBA
Enhanced Academic Support

	Group A	Group B
EAS intervention	X	
Treatment as usual		X

GIC

Evaluating the effect of elements

4 practice elements

2 implementation elements

= 6 factors

- 6 individuals RCT's. n needed 3072 (12 different conditions)
- Factorial design. N needed 512 (64 experimental conditions)

KOBA
Enhanced Academic Support

CO-TEEN

An mental health intervention for Emotion regulation in youth at risk

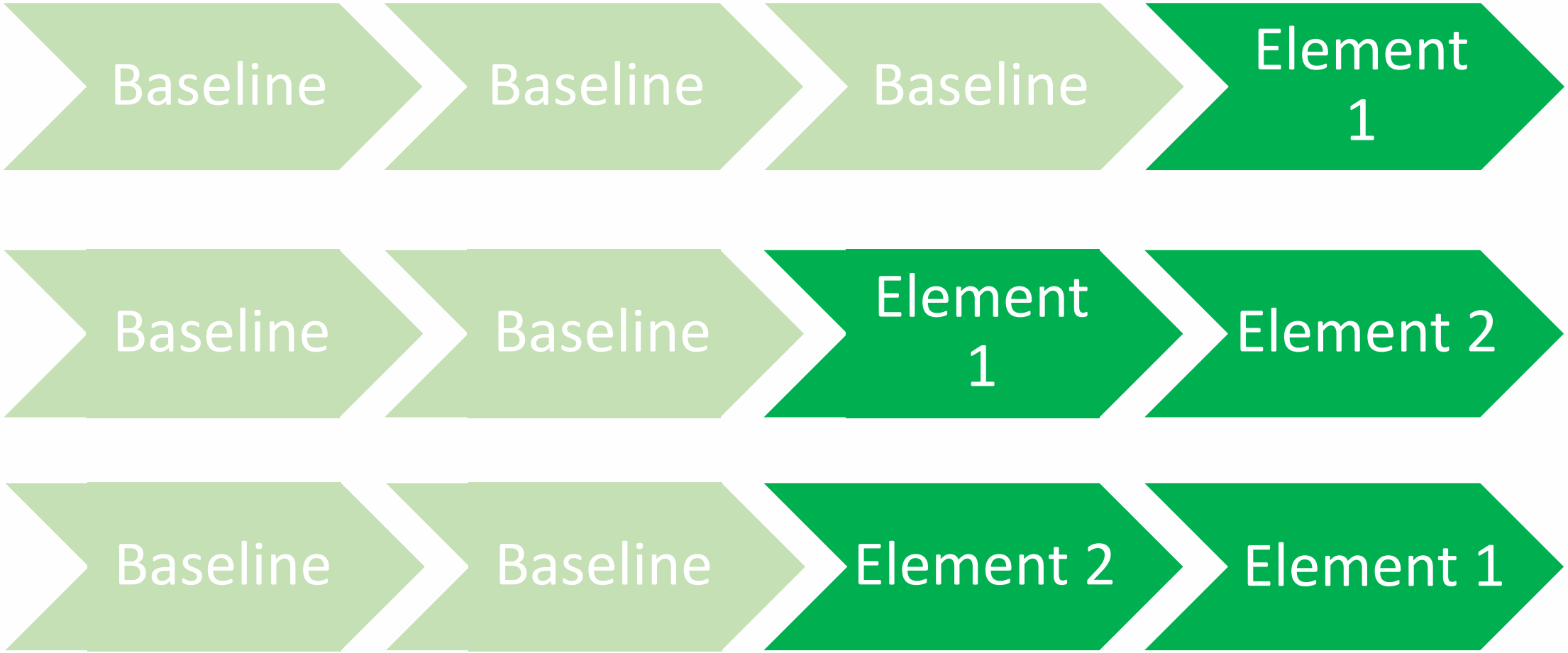
	Group A	Group B
EAS intervention	X	
Treatment as usual		X

	Group A	Group B	Group C	Group D
Emotion regulation intervention	X		X	
Treatment as usual		X		X
Measurement feedback system			X	X

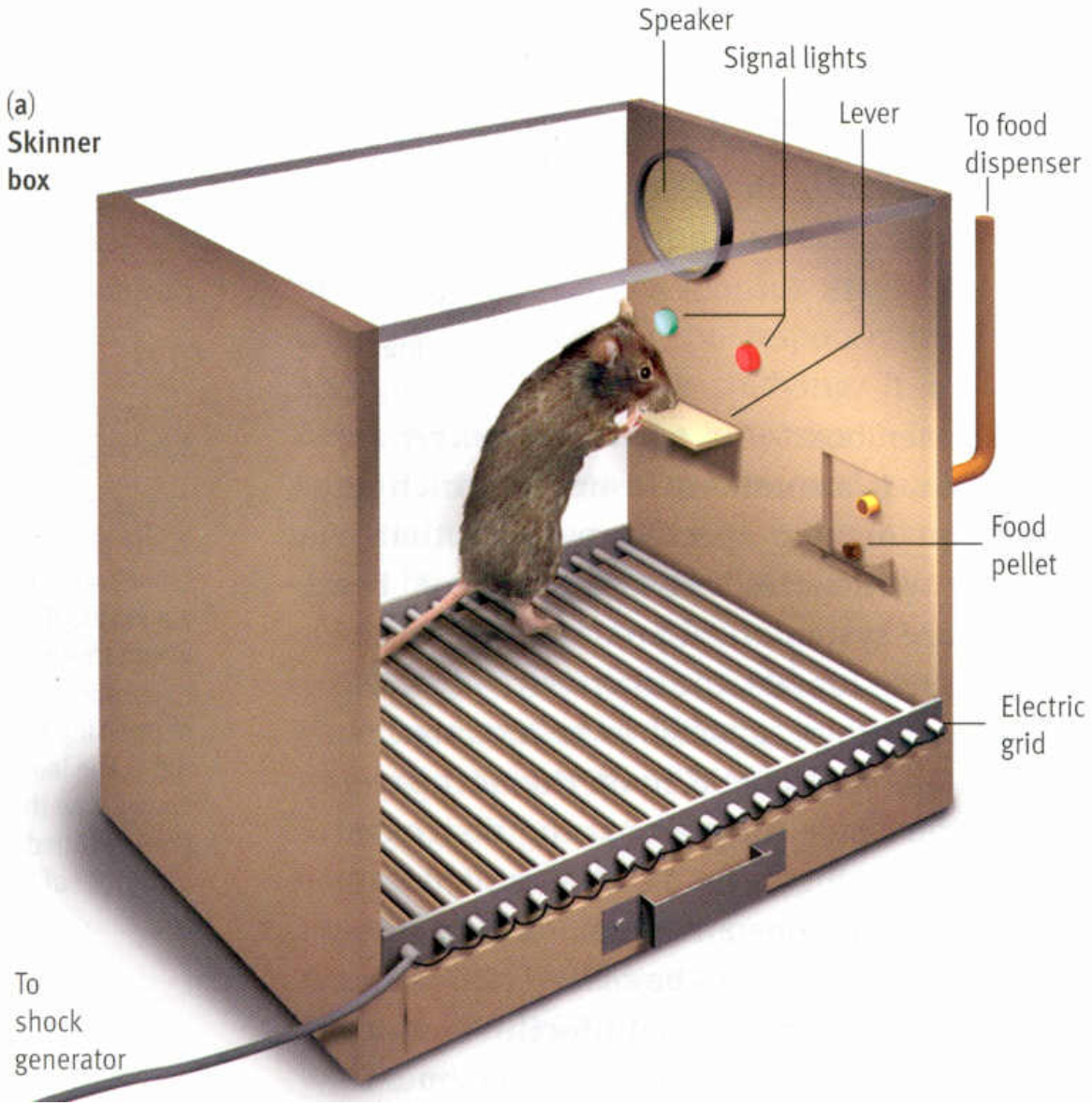
GIC

CORE Child Welfare (Common elements of child maltreatment interventions)

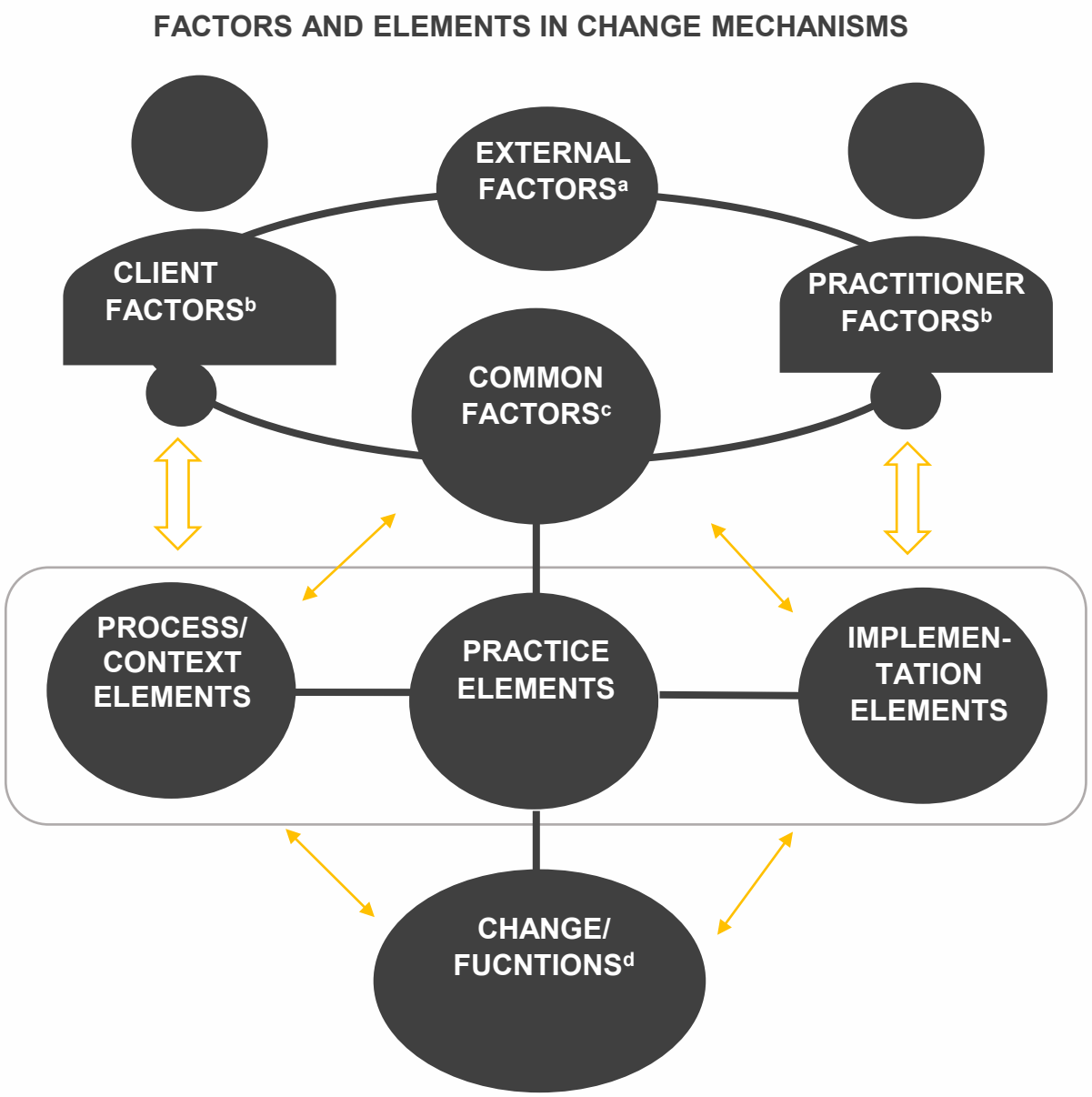
Participants are randomized to different baseline



Evaluating the effect of elements



Evaluating the effects of elements



Investigation on the level of elements increases our understanding of how interventions and implementations work

Element level knowledge may help us improve implementability without comprimising effectiveness, and thereby might increase adoption and impact of our interventions