Using the Behaviour Change Wheel to shape the 'Baby Buddy Champions' intervention for re-framing antenatal education in Cyprus

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Abstract

Background

The Baby Buddy Cyprus webapp was co-created with parents and health professionals within a Participatory Action Research framework. Baby Buddy can support the educational role of mother-child healthcare providers (HP); however, antenatal education (AE) may be currently perceived as a formal activity within the physical space of the antenatal class. We aimed to gain an understanding of influences on midwives engaging in an educational role during routine appointments and propose, on the basis of the 'behaviour diagnosis', a potential intervention using the Behaviour Change Wheel (BCW) framework.

Methods

This is a formative research study guided by the COM-B model and related Theoretical Domains Framework (TDF). Complimentary methods were used to collect information from in-training and registered midwives: focus group (N = 11), questionnaire survey (N = 24) and Nominal Group Technique during workshops (N = 40). Deductive content analysis of qualitative data and quantitative survey analysis, tapping on 6 COM-B and 14 TDF domains, guided the design of a multicomponent intervention.

Results

AE is viewed as a core function of the professional role, yet neither supported nor prioritized by current practices. Problematic areas relate to organizational context, such as weak interprofessional collaboration and lack of policy, protocols and resources. In addition, medicalization of birth and related socio-cultural norms, pertaining to users and providers, are sustaining alienation of the midwife and conditions of power dynamics. AE was perceived as a means to enhance the autonomy of the profession but there are might be issues with procedural knowledge and the need for skill development was identified. Several intervention functions were identified as promising, however cognitive re-framing through strategic communication and modelling may also be needed both in terms of providing "credible models" for the role itself as well as re-framing AE through the concept of "making every contact count".

Conclusions

AE is currently perceived to be a 'bad fit' with routine practice. The study proposed an intervention to enhance midwives' educational role and professional identity, while embedding Baby Buddy in clinical practice to facilitate the process. In addition to designing a theory-driven research-informed potential intervention, the process functioned as a participatory learning experience through collective reflection.

Contribution To The Literature

- Digital tools and resources have the potential to transform antenatal education but only if adopted by healthcare providers as part of everyday clinical practice.
- Several barriers to being an effective educator have been described; yet, previous studies do not always incorporate an explicit process of translating the findings into designing an intervention to affect change.
- This study describes all the stages of the Behaviour Change Wheel process from using mixed-methods to diagnose the issue among midwives in Cyprus to intervention mapping.
- Guided by Participatory Action Research, the process was also instrumental in cultivating a new shared awareness of the issue.

Background

The transition to parenthood is a "*window of opportunity*" for the establishment of health-promoting behaviours. The goal of antenatal education (AE) is to support expectant parents through this life-changing event [1, 2]. "Traditional" approaches to AE include structured programmes, of various duration and content, often in group sessions, mainly focusing on preparation for childbirth. Attendance is not always high; in Cyprus, only one in three women attend classes [3, 4]. Furthermore, their effectiveness has been

questioned in terms of whether they address the real needs of expectant parents [5–8] and their inclusiveness with evidence of inequalities in access and outcomes [9–11].

While every contact with a healthcare provider can be a "*teachable moment*" [12], these encounters may not be as rewarding and the experience can be dependent on the quality of the user-provider communication [13, 14]. The WHO recommendations (2016) for a positive pregnancy experience and optimal maternal and newborn health refer to "*Respectful Maternity Care*" [15]. The framework recognizes informational and emotional support as a prerequisite, provided "*by knowledgeable, supportive and respectful health-care practitioners with good clinical and interpersonal skills within a well-functioning health system*". A range of reasons have been previously described as to why healthcare providers may not be actively engaging with expectant parents in an educational capacity during appointments, such as time and resource constraints but also lack of confidence in skills and competences [16–18].

New technologies are playing an increasingly important role and digital innovation can assist in the education role [19]. Baby Buddy Forward is a Participatory Action Research programme which assessed the cross-cultural transferability of the Baby Buddy app from the UK to Cyprus. The Baby Buddy Cyprus webapp was co-created through an iterative approach with the participation of over 800 parents-to-be and health professionals. Other than widening opportunities to evidence-based information, Baby Buddy offers a complimentary tool to assist healthcare providers in their educational role. However, the impact of digital technologies can only be maximized when embedded in local care pathways.

Aim

This formative study aims to (a) gain an understanding as to why midwives in Cyprus may not be actively engaging in an educational capacity during routine appointments and (b) propose an intervention guided by the Behaviour Change Wheel. While the issue concerns all maternal-child healthcare providers, antenatal education is a core part of midwives' professional role.

Methods

A range of methods can be utilized in the process of behaviour diagnosis [20]. The study reports on three complementary sources: focus group (*study A*), questionnaire survey (*study B*) and participatory learning workshop (*study C*). In all three, the COM-B model and Theoretical Domains Framework (TDF) were adopted for informing data collection and analysis.

COM-B, TDF and Behaviour Change Wheel

The Behaviour Change Wheel (BCW) [20] offers a structured process of designing an intervention (*second phase*) based on what is understood about the target behaviour (*first phase*). At the core is the COM-B model, recognizing Capability, Opportunity and Motivation as an interacting system of determinants of Behaviour (= B). Capability is further defined as physical and psychological, Opportunity, as physical and social, and Motivation, as automatic and reflective. The process of defining influences on the behaviour of interest (*"not engaging in an education capacity during routine appointments"*) in behaviour terms can be enhanced by the more detailed Theoretical Domains Framework (TDF) The components of the two models and their relationship are presented in *Additional File 1* [21].

The two outer layers of the wheel refer to nine intervention functions that can be used to affect behaviour (namely: Education, Persuasion, Incentivisation, Coercion, Training, Enablement, Modelling, Environmental Restructuring and Restrictions) and seven policy categories to support delivery (namely, Guidelines, Environmental planning, Service provision, Communications and Marketing, Fiscal measures, Regulation and Legislation). Specific Behaviour Chance Techniques (BCTs), considered 'active ingredients' of the intervention, can be selected from a taxonomy of 93 BCTs in 16 categories [22].

Implementation process

Each of the studies is described below (phase 1). In order to frame the method, findings and proposed intervention in the context of the literature, a rapid review was performed to identify similar studies among midwives internationally (*study D*). Intervention design (phase 2) was performed by the Baby Buddy Forward core team, arriving at recommendations by consensus, after formal training in the implementation of the BCW. Methodology reporting standards were observed, both for reporting qualitative studies (COREQ) and for reporting implementation studies (StaRI checklist) - *Additional file 2*.

Study A: Focus groups and written response to open-ended question

Postgraduate midwifery students in their final semester prior to registration (N = 11) were provided with a statement regarding "teachable moments" and an open question on factors that facilitate or present obstacles for a midwife to actively engage in an educational capacity during appointments. Deductive content analysis was used to code the written responses along the COM-B model. The unit of analysis was short phrases, as a full sentence may contain elements pertaining to different domains. The transcripts were read several times to ensure familiarity and coded independently by two researchers (NM, public health researcher and EH, academic midwife), who discussed and resolved any disagreement in terms of the classification (MK, academic nurse). This was followed by a two-hour focus group session which guided the re-coding of the material according to the more detailed TDF. The online session, which was recorded, started with a brief presentation of the initial classification, allowing participants to provide feedback, elaborate on their responses or raise additional suggestions. A topic guide, adapted from previous studies [23–25] was used to structure the discussion (*Additional File 3*).

Study B: Questionnaire survey

A questionnaire survey was distributed online to members of the Midwives Committee of the Cyprus Nurses and Midwives Association (N = 24, 38% with more than 20 years of experience). A generic tool, referring to A = Action, C = context, T = time, and Ta = target was used with permission from the developers [26–28]. The tool was adapted to refer to antenatal education and counseling (A) during routine antenatal appointments (C, T) with pregnant women and partners (Ta). The original versions consist of 79–93 items [26, 27]. A shorter 38-item version was also proposed [28], which nevertheless does not cover all TDF domains. After comparing the three versions, an 83-item tool was compiled (see *Additional File 4*, along with the Greek translation). A forward-backward translation process was used to retain semantic equivalence. Each item is measured on a 6-point Likert response scale (Totally Disagree-Totally Agree, or similar depending on question). Due to the length of the questionnaire, items were grouped based on similar wording and introduced as sub-items around a common stem.

Study C: Participatory learning workshop

The launch of Baby Buddy provided an opportunity for a participatory learning activity around challenges faced by registered midwives (RM) in performing their educational role. A workshop was organised with a sub-set of delegates (N = 40) in parallel groups due to room size restrictions related to COVID-19. After a short presentation, each group was given 30 minutes to reflect as a team and record their collective experience on an A3 worksheet along the COM-B dimensions. A modified Nominal Group Technique approach was used to structure the discussion. In a round-robin session, suggestions were written on a whiteboard and the process continued until there were no more suggestions. If a suggestion was similar to a previous point, the group would decide whether it merited to be mentioned as distinct. The process did not include voting and ranking since the purpose was to collect as many suggestions as possible.

Study D: Rapid literature review

A rapid review was performed to identify studies that explored barriers to midwives' educational role using the COM-B and/or TDF to collect and/or analyze data. The search strategy, inclusion/exclusion criteria and identified studies are presented in *Additional File 5*.

Ethical considerations

The study was performed in accordance with the Declaration of Helsinki and has been approved by the Cyprus National Bioethics Committee as part of the wider Baby Buddy Forward programme. Before participating in face-to-face sessions or completing the questionnaire, the purpose and process of data collection and analysis were explained to the participants who provided informed consent. Confidentiality of the information provided in face-to-face sessions was maintained by anonymization when presenting quotes. With regard to the survey, participation was anonymous and no personal data was recorded.

Results

Table 1 presents a count summary of the content analysis of study A, along with example quotes across the COM-B and TDF. "Environmental Context and Resources" was the domain with the highest frequency of quotes. Consistently, this was the domain with the lowest score in the survey, especially with regard to resources, policy, training opportunities and other support mechanisms.

Table 1
Frequency of quotes (intensity) and participants referring to each domain (count) classified according to COM-B and TDF.

Theoretical Domain Framework	COM-B	Participants											Count	Intensity	Characteristic quote
		1	2	3	4	5	6	7	8	9	10	11			
(1) **Skills (physical)**	**Physical Capability**												0	0	
Skills (cognitive & interpersonal)	**Psychological Capability**	√		√				√	√	√	√	√	7	9	“The **skills** needed by a midwife who works in the maternity ward, and operates within routine practice, are different from the ones needed by a midwife working with pregnant women [re: antenatal clinic]”
(2) **Knowledge**		√		√				√	√	√	√	√			"I noticed that each midwife offers different ‘knowledge' [*re: information*], resulting in confusion and misinformation. This is done either….or … or due to actual lack of **knowledge**”
(3) **Memory, attention & decision process**		√				√				√			3	3	"…small number of midwives … As a result, a midwife is often **unable to devote** as much time as needed to a pregnant woman”
(4) **Behavioural regulation**				√					√				2	2	"Factors which can facilitate the educational role of the midwife are…., (2) **planning** of midwifery care, (3) cooperation with other health professionals, (4)…."

Theoretical Domain Framework	COM-B	Participants											Count	Intensity	Characteristic quote
		1	2	3	4	5	6	7	8	9	10	11			
(5) **Environmental context & Resources**	**Physical Opportunity**	√	√	√	√	√	√	√	√	√	√		10	18	“Personal contact presupposes … a suitable space with a desk and a computer, comfortable chairs, beautiful, friendly **environment**…”, “…available, accessible and good-quality educational material and services… there is insufficient **resources**…"
(6) **Social influences**	**Social Opportunity**		√	√	√	√		√	√				6	9	"…the **medicalization** of the birth but also the **mentality** of many Cypriots who always seek the opinion of the doctor"
(7) **Social or Professional Role & Identity**	**Reflective Motivation**			√					√		√	√	4	8	“A midwife has a **duty** to provide equal care to all without discrimination…” “…midwives work with significant limitations in terms of their **autonomy**”
(8) **Beliefs about Capabilities**				√				√					2	3	“The midwife **has accepted** this way of working, to monitor the pregnant women only at the time of childbirth… as a result she does not train more, does not specialize, does not take initiative and does not assume her educational role beyond the moment of childbirth and for breastfeeding support”

Theoretical Domain Framework	COM-B	Participants											Count	Intensity	Characteristic quote
		1	2	3	4	5	6	7	8	9	10	11			
(9) **Beliefs about Consequences**			√			√	√	√	√				5	6	"[A midwife] has an important role to play with regard to counselling and education, not only for the **women but also for the whole family, as well as for the community**. Her work includes prenatal education and preparation for parenting but can be extended to women's health, sexual and reproductive health, and pediatric care"
(10) **Optimism**								√			√	√	3	3	"Today's midwives must have the **courage** [to dare] to showcase their abilities in order to promote their autonomy as midwives."
(11) **Intentions**								√		√			2	2	"…**indifference** on the part of midwives" "…it depends on the **personal will**, desire and time each midwife has"
(12) **Goals**									√	√	√		3	3	"… the most important [facilitating] factor is to have or be able to build a **relationship based on trust** between the pregnant woman and the midwife"
(13) **Reinforcement**	**Automatic Motivation**			√		√	√	√	√	√			6	7	"…there isn't any **common code of practice** or guidelines, which if existed the problem would be resolved."

Theoretical Domain Framework	COM-B	Participants											Count	Intensity	Characteristic quote
		1	2	3	4	5	6	7	8	9	10	11			
(14) **Emotion**										√	√	√	3	5	"…increases the **job satisfaction** and enhances professional autonomy and responsibility in the workplace"

[Table 1]

Table 2 presents survey scores (study B) along the 24 TDF sub-domains, reversed ranked from more to less problematic. "Social and Professional Role and Identity" along with "Beliefs about Consequences" received the highest scores. While "Intentions" also scored high, achieving "Goals" received one of the lowest scores, mainly due to competing priorities, a frequent description among participants in the other two studies.

Table 2
Scores and rank of more to less problematic aspects classified by TDF domains (N = 14) and sub-domains (N = 24).

Domains (N = 14)	Items (N = 83)	Sub-domains (N = 24)	6-point Likert disagreement agreement scale		Sub-domain score (theor. range 1–6)		Rank (reverse)
			Mean	SD	Mean	SD	
Knowledge	Aware	Procedural knowledge & Role clarity (4 items)	5.46	0.78	5.43	0.60	20
	Know		5.54	0.66			
	Familiar		5.25	0.94			
	Expected (role clarity)		5.46	0.78			
Skills	Trained	Skills (4 items)	5.50	0.59	5.34	0.56	19
	Skills		5.38	0.71			
	Practiced		5.25	0.85			
	Proficiency		5.25	0.74			
Social/professional role and identity	Part of work	Professional role (4 items)	5.71	0.55	5.73	0.43	24
	Job as midwife		5.71	0.55			
	Professional Responsibility		5.75	0.44			
	Consistent with profession		5.75	0.53			
Beliefs about capabilities	Confident – even if participants not motivated	Self-efficacy (3 items)	5.04	0.81	5.28	0.63	17
	Confident – when little time		5.25	0.85			
	Self-confident		5.54	0.66			
	Control	Perceived behavioural control (3 items)	4.38	1.41	4.81	0.83	10
	Difficult-Easy		4.92	0.88			
	Impossible-Possible		5.13	0.95			
Optimism	Expect best in uncertain times	Optimism (3 items)	5.13	0.99	5.32	0.66	18
	Optimistic about the future		5.46	0.66			
	Expect more good than bad		5.38	0.71			
Beliefs about consequences	Benefit mother-child health	Outcome expectancies (5 items)	5.79	0.41	5.43	0.48	21
	Benefit public health		5.67	0.56			
	Disadvantages for relationship (*reverse*)		4.54	1.38			
	Satisfaction		5.63	0.58			
	Collaboration with professionals		5.54	0.72			
	Useless – useful	Attitudes (3 items)	5.58	1.10	5.72	0.57	23

Domains (N = 14)	Items (N = 83)	Sub-domains (N = 24)	6-point Likert disagreement agreement scale		Sub-domain score (theor. range 1–6)		Rank (reverse)
			Mean	SD	Mean	SD	
	Bad – Good		5.79	0.51			
	Not worthwhile - Worthwhile		5.79	0.51			
Reinforcement	Financial reimbursement	Reinforcement (4 items)	2.38	1.58	4.49	0.65	5
	Recognition from peers		4.71	1.12			
	Make a difference		5.21	0.88			
	Recognition from participants		5.67	0.48			
Intentions	Next 10 appointments	Intention (4 items)	5.42	0.95	5.63	0.52	22
	Determination		5.54	0.72			
	Intention		5.75	0.53			
	Strength of intention		5.79	0.51			
Goals	Clear plan - Process	Priority (4 items)	5.17	0.76	3.98	0.67	4
	Clear plan - Frequency		4.88	0.80			
	Higher priority (*reverse*)		2.79	1.25			
	More urgent (*reverse*)		3.08	1.02			
Memory, attention and decision processes	Easy to remember	Memory and Attention (5 items)	4.92	0.93	4.76	0.70	9
	Forget		4.96	1.23			
	Concentration		5.00	1.14			
	Distracting thoughts (*reverse*)		4.21	1.44			
	Attention focus		4.71	1.04			
Environmental context and resources	Institutional financial support	Characteristic of socio-political context (4 items)	2.79	1.32	3.65	1.14	3
	Good networks between parties		3.79	1.28			
	Fit with routine practice		4.13	1.45			
	Routine in organization		3.88	1.54			
	Enough time	Organizational resources (6 items)	3.50	1.32	3.31	0.99	1
	Professional training		3.96	1.37			
	Necessary resources		3.04	1.37			
	Financial reimbursement		2.33	1.20			

Domains (N = 14)	Items (N = 83)	Sub-domains (N = 24)	6-point Likert disagreement agreement scale		Sub-domain score (theor. range 1–6)		Rank (reverse)
			Mean	SD	Mean	SD	
	Sufficient material		3.75	1.39			
	Assistance		3.25	1.39			
	Motivation of participants	Characteristics of participants (2 items)	4.83	1.13	4.90	1.12	12
	Positive response from participants		4.96	1.16			
Social influences	Peer acceptance	Subjective norm (2 items)	5.17	0.87	5.17	0.86	14
	Peer approval		5.17	0.87			
	Rely on team of professionals	Social support (4 items)	4.42	1.28	4.57	0.99	7
	Colleagues are willing to listen		4.63	1.17			
	Helpful team of professionals		4.50	1.18			
	Rely on colleagues		4.75	1.03			
	Team of professionals do it	Descriptive norm (2 items)	4.46	1.22	4.56	1.07	6
	Respected colleagues do it		4.67	1.17			
	Management support	Organizational support (3 items)	3.46	1.41	3.53	1.39	2
	Management willing to listen		3.46	1.44			
	Helpful management		3.67	1.40			
Emotion	Enjoy normal day-to-day activities	Stress (2 items)	4.83	1.05	4.63	0.85	8
	Unhappy and depressed (*reverse*)		4.42	1.21			
	Inspired	Affect: Positive and negative emotions (2 items)	5.42	0.65	5.04	0.79	13
	Nervous (*reverse*)		4.67	1.27			
Behavioural regulation	Automatically	Automaticity (4 items)	5.29	1.04	5.21	0.81	16
	Without thinking		5.13	0.99			
	Without having to consciously remember		5.29	1.00			
	Start before realize doing it		5.13	1.36			
	Track of overall progress	Self-monitoring (3 items)	5.21	0.88	5.18	0.77	15
	Aware of day-to-day behaviour		5.00	0.78			
	Notice successes		5.33	0.87			

Domains (N = 14)	Items (N = 83)	Sub-domains (N = 24)	6-point Likert disagreement agreement scale		Sub-domain score (theor. range 1–6)		Rank (reverse)
			Mean	SD	Mean	SD	
	Planning - when participants not motivated	Coping planning (3 items)	4.71	1.27	4.88	0.82	11
	Planning -when little time		4.67	1.09			
	Planning – even if others do not do this		5.25	0.61			

Legend: The various TDF sub-domains (N = 24) are ranked in reverse order based on mean scores to reflect in ascending order more to less problematic areas related to midwives' educational role.

Finally, Table 3 lists influences as classified according to the COM-B during the workshop (study C). These assisted in contextualizing and interpreting findings from the other two studies. Findings were generally consistent with few exceptions. For instance, while in the survey (midwives' association), knowledge and skills scored high, focus group (in-training midwives) and workshop participants (RM) identified the need for skills strengthening.

Table 3
Influences on midwives' educational role classified according to Capability, Opportunity and Motivation during participatory learning workshop (N = 40).

Capability	Opportunity	Motivation
• **Continuous education** and professional development: seminars, workshops, conferences, specialised training programmes • **In-hospital training**: absence of formal mechanism for transmission of new knowledge and integration of professional development activities in clinical practice • Lack of targeted training in the **educational role** for the development of practical skills • Lack of **specialist role** with training in antenatal education and counselling • **Digital skills**: using online and other digital resources or new technologies • Strengthening **communication skills** • **Cultural competence** skills needed in changing multicultural environment • **Critical appraisal** skills to keep up-to-date with evidence-based practice • **Evidence-based practice** skills: Ability to refer to and use **evidence** in the context of educational capacity	• Inappropriate **infrastructure** / unfriendly spaces, not offering comfort and privacy • Lack of **resources**: • Lack of educational and informational **material** and other resources • Insufficient or non-existent **financial resources** for the creation of material, even if intention exists • Lack of **equipment** (e.g. computers) or old-age with no regular maintenance • No access to **internet** and online sources of information in clinical settings • **Barriers to access**: • Minimal contact with midwives before childbirth (especially in private sector) • **Not institutionalization** of educational role of midwives by organizations / healthcare system • Need for establishment of **autonomous** and complementary role • **Direct access** to midwives without referral from an Obstetrician - Gynecologist within new National Healthcre system, even if limited • **Medicalization**: • **Understaffing** and lack of **time** • **Undervalued**: non-recognition of the importance of antenatal education by administration / healthcare system vs midwifery-led care) • Professional role **boundaries** and inter-professional **conflict** • Lack of common **policy** and **protocols** (roles, actions, referrals, etc.) • **Interdisciplinarty/ interprofessional** activities: • Weak **interdisciplinary** collaboration in clinical practice • Incompatible **interprofessional** activities, values and skills • Need for tighter collaboration and **partnerships** between professional associations and scientific bodies	• Competing **priorities** due to work overload / reduced **control** over decision making • Inefficient **human resources** utilization • **Professional status and identity**: Unfamiliarity and lack of trust in midwives due to medicalization of birth • **No continuity of care**: Fragmented contact with midwife reduces motivation • **Decentralization**: different roles and responsibilities between state and private maternity hospitals • Educational role as a **means** for • promoting and showcasing **autonomous role** of midwives • improving **job satisfaction** - • Strengthening **inter-professional cooperation** in the context of developing guidelines, protocols and material • **Avoidance** of educational role • conflicting views with prevailing **medicalised care** • i**ncompatible policies** and contradictory messages e.g. maternity leave less than 6 months Vs recommendations for exclusive breastfeeding up to 6 months • **Resistance** to change/ **complacency** due to civil servant status in public sector • No **continuity** of care –No **community** midwifery • Lack of **incentives, recognition or rewards** for professional development • **Unequal opportunities** for professional development • No formal **evaluation system** for career progression • No wider **culture of continuing education** and professional development • Establishment of first midwifery-led natural **birth centre** reason for optimism

Capability	Opportunity	Motivation
	• Limited availability of **joint training** programs with other healthcare professionals • **Linguistic barriers**: Inability to communicate with non-Greek healthcare users/ no translators / little to no material in other languages	

[Table 2]

[Table 3]

An integrated account from all three studies follows, structured along the COM-B domains.

Phase 1: Behaviour diagnosis

Physical Opportunity

Many of the problematic areas relate to the Context where the activity takes place and lack of Resources. Understaffing, heavy workload, lack of time and competing priorities do not present opportunities for a midwife to engage effectively in an educational role:

- Participant 2: *"…small number of midwives … As a result, a midwife is often unable to devote as much time as needed to a pregnant woman".*

In addition, unwelcoming spaces and other physical barriers act as additional stressors. Often, the activity takes place in uncomfortable settings or situations due to lack of dedicated spaces. This person-environment interaction stressors raise issues of privacy.

- Participant 9: *"…midwives meet 2 or even 3 women in the same room at the same time without any privacy… ".*
- Participant 1: *"Personal contact presupposes the availability of time for discussion and questions, but also a suitable space with a desk and a computer, comfortable chairs, a beautiful, friendly environment…".*

Participants referred to lack of material (e.g. leaflets), equipment (e.g. computers), facilities (e.g. internet access) and other necessary resources. Weak institutional financial support prevents from developing material, even if the initiative exists. There are also linguistic barriers with service-users who are non-Greek speakers.

- Participant 1: *"…available, accessible and good quality educational material and services …there isn't sufficient material and resources, …".*
- Participant 6: *"…the issue of language and communication is an obstacle … a large proportion of women are from abroad … material should be translated and antenatal classes should be provided in other languages or there should be a translator available"*

More importantly, the fact that the educational role of the midwife is not institutionalized by the system is presenting barriers to non-fragmented access to the women. In fact, the opportunity that the system affords the midwife is significantly diminished in the private sector, where the midwife might not have any meaningful contact with the woman before labour.

- Participant 7: *"…all pregnant women are monitored by the doctor, midwives in hospitals see them for a minute or two for vital signs and in private clinics women do not even come in contact with the midwife, only the doctor".*

The current model of healthcare delivery directly reduces the opportunity for meaningful contact, but also acts as a deterrent by impacting motivation.

- *Participant 9: "…there is no contact with the same midwife on every prenatal visit [re: continuity of care], so there is no trusting relationship between midwives and women… this whole thing makes any implementation of the educational role really difficult".*

- *Participant 7: "…the time [a midwife] has with the woman is only 3–4 days until discharge, there is no community midwifery. This is a deterrent to assuming an educational role in the first place…"*.

Social Opportunity

Medicalization of birth was viewed as a big contributor to the reduced opportunity for a midwife to be an educator. Physician dominance is sustaining power dynamics. This is reinforced by the healthcare system itself as well as socio-cultural norms.

- Participant 5: *"…the presentation of the gynecologist as an authority".*
- Participant 7: *"[Re: relationship with doctor]…this is what the system cultivates*".

Unfamiliarity or even misconceptions about the role of midwives are alienating the midwife from developing a direct and meaningful relationship with pregnant women.

- Participant 8: *"…unsatisfactory communication between midwives and women resulting in lack of trust and unwillingness to collaborate [with the midwife]".*

This is reinforced by the lack of role clarity and referral system.

- Participant 2: *"[re: lack of referral system] A midwife should be able to monitor a normal pregnancy, provide advice and refer where needed to the appropriate health professional".*
- Participant 8: "*… lack of collaboration with other health professionals and links with provided services*, …"

The lack of interprofessional collaboration extends to the policy level. The need for central coordination and closer relationships between professional associations was identified. Weak links between scientific bodies in the field of maternal and child health act as a barrier in developing a common policy, guidelines and standard protocols (roles, actions, referrals, etc).

- Participant 9 – *"No common code of practice or guidelines, which if existed the problem would be resolved"*

Physical Capability

Even though many of the identified barriers relate to organizational factors and culture, physical capability may also be an issue as a result of staff shortages and heavy workload. This may create conditions of cognitive overload affecting the willingness to perform the activity, which is described as 'demanding' if it were to be effective and personalized.

- Participant 5: *"… staff shortages is already a problem,…, if an individualized care approach is to be adopted an even larger number of midwives will be required".*

Psychological Capability

As an activity, it is out of direct control, especially when others things are perceived by the system as having higher priority. However, there might also be issues with procedural knowledge (e.g. how to perform this role) as well as "knowledge" base in general. At times, this might result in avoidance to engage in the role due to perceived lack of confidence.

- Participant 9: *"I noticed that each midwife offers different 'knowledge' [re: information] to new mums, resulting in confusion and misinformation. This is done either…or … or due to actual lack of knowledge by the midwife".*

Specific skills and competences are needed to effectively and competently perform this role and the need for skill development and assessment processes was identified.

- Participant 4: *"Better training. The training [re: continuous education] is inadequate"*
- Participant 1: "*The skills necessary for a midwife who works in the ward and operates within routine practice are different to those of the midwife who works with pregnant women [Re: antenatal clinic]".*
- Participant 7: *"There is no form of skill assessment"*

Skills and competences that might need strengthening include: pedagogical methods, health and interpersonal communication, digital skills and use of technology, cultural competence, inter-professional collaboration, critical appraisal and evidence-based practice.

- Participant 11: "*Today's midwives must be well-trained, equipped with best knowledge, experience and skills. A midwife must be in a position to understand, cooperate and communicate, being able to justify every procedure and intervention based on available evidence".*
- Participant 8: *"…adequate continuous education …the ability of midwives to combine their clinical knowledge and skills with interpersonal and transcultural skills".*

Participants identified the need for professional development to be frequent, systematic, in-service and interprofessional, with emphasis on experiential learning. They also identified the need for a specialization in Antenatal Education, currently lacking.

- Participant 1: *"There [re: Antenatal Care Clinic], it is much more likely for a midwife to be called upon to answer questions and thus in this way get the chance to develop into the educational role every day…".*
- Participant 10: *"Midwives involved in antenatal education should follow a specialization programme to become expert educators"*

Reflective Motivation

Antenatal education is viewed as a core function of the professional role and described as a duty.

- Participant 8: "[*A midwife] has an important role, not only for the women but also for the whole family, and the community. Her work includes antenatal education and preparation for parenting but can be extended to women's health, sexual and reproductive health, and pediatric care*".
- Participant 11: *"A midwife has a duty to provide equal care to all … we need to appreciate the seriousness of the profession we have chosen"*

While intentions are strong, setting goals is difficult when other activities perceived as more necessary and urgent take priority. Antenatal education and the midwifery-led model of care are not valued by the current system.

- Participant 11: *"…midwives work with significant limitations in terms of their autonomy."*
- Participant 2: *"…no emphasis on antenatal education and care".*
- Participant 4: *"One factor that would facilitate the role of the midwife in the future is the implementation of personalized midwifery care. That is, to have a midwife for every four women, for example, so that there is time to dedicate to each woman individually"*

The opportunity afforded by newly RM to apply what they learned at University is reduced by a theory-practice gap (Participant 3: *"Theory is completely different from practice")*, making it difficult for a newcomer midwife to differentiate from predominant practices. The role of the "experienced midwife educator" was identified as an asset and an opportunity by providing observable role models.

- Participant 5: *"… through in-hospital mentoring, midwives [re: experienced midwives] can contribute by providing an example to follow".*
- Participant 7: *"… the informal process by which a midwife acquires the common culture of midwifery, the values, beliefs, attitudes, patterns of behavior and social identity of midwifery"*

Descriptions of the benefits of antenatal education included a range of positive outcome expectancies, even though these were often described as distal goals rather than tangible outcomes, such as: personalised care, trusting relationships and cooperative alliances etc. At the same time, certain aspects of the healthcare system might influence midwives' beliefs about the effectiveness or even feasibility of antenatal education. The lack of continuity of care and community midwifery are perceived as 'deterrents' (i.e. "*is it worth it?*" or "*is it even feasible?*").

- Participant 9: *"…there is no contact with the same midwife between successive appointments [re: continuation of care]"*

- Participant 4: *"… after women leave the maternity clinic, there is no contact with the midwives… this is a problem".*

Furthermore, physician dominance might create conditions for anticipated regret as a disagreement in opinion or confrontation may arise. Unclear role boundaries and weak interprofessional collaboration seem to sustain power dynamics, creating situations which undermine the role of the midwife.

- Participant 7: "*A pregnant woman develops a relationship only with her doctor, she only sees the doctor, and has confidence in what he/she tells her, the doctor is the person to refer to for questions".*
- Participant 2: *"…the medicalization of the profession but also the mentality of many Cypriots who always seek the opinion of the doctor".*

There appeared to be a 'struggle' between group conformity (i.e. "*accepted way things are*", "*indifference*", "*no initiative*") and determination ("*courage to dare*").

- Participant 7: "*The midwife has accepted this way of working …as a result she does not train more, does not specialize, does not take initiative and does not assume an educational role beyond the moment of childbirth and for breastfeeding support*"
- Participant 1: *"Today's midwives must have the courage to dare to showcase their abilities in order to promote their autonomy as midwives"*

Indeed, the educational role was perceived as the means to showcase the professional role and further enhance the autonomy of the profession

- Participant 11: *"… expanding the role of the midwife has the potential to provide high quality continuous maternity care to women, which increases the job satisfaction of midwives, promotes and enhances professional autonomy and responsibility in the workplace"*
- Participant 4: *"… and that's why there should be Community Midwifery, giving the midwives the opportunity to promote their educational role"*

Automatic Motivation

Emotional responses to the role were generally positive, stemming from a sense of satisfaction when successfully engaging in this role but also pride about specific achievements that showcase the midwifery model of care. For example, the recent establishment of the first midwifery-led birth centre offered optimism. However, the activity may also be a source of negative emotions (e.g. discomfort due to unfriendly spaces, lack of trust due to contradicting advice from physicians). There were also negative emotions caused by the inability to provide equal care to all due to lack of time and/or linguistic barriers.

- Participant 10: *"…this is without intention, this problem of unequal provision of care, is without intention, but due to the barriers that exist ".*
- Participant 11: *"… care should not be impersonal and each woman should feel safe and that she can trust what the midwife tells her..."*

While intentions to engage in antenatal education appear strong, they may not be stable but "*depend on the will, desire and time*". Dissatisfaction with the current situation may lead to pessimism (*"…any implementation of the educational role by the midwife really difficult"*). Guidelines, protocols and practice standards are viewed as vital as they would reinforce procedural knowledge ("know-how") and reduce the anticipated regret of potential differences in opinion. Currently, there are no incentives or rewards. Even opportunities provided for professional development do not seem to be equally distributed among staff. The civil servant status in the public sector, no distribution of roles and responsibilities based on skills and abilities and lack of evaluation for career progression are disincentives.

- Participant 8: *"…better distribution of roles and responsibilities based on needs, abilities and resources"*
- Participant 3: *"Better evaluation system…. more opportunities to gain experience"*,

Phase 2: Intervention mapping

The phenomenon is complex and a multi-component intervention would be needed to impact Capability, Opportunity and Motivation of midwives to actively engage in antenatal education. Figure 1 presents an overview of the intervention functions chosen along with related policy categories. In all cases, Baby Buddy was incorporated in the suggestions. An account follows while a list of eighteen possible BCTs appear in *Additional File 6*.

[Figure 1]

Enablement and re-structuring through environmental planning

As a digital tool, Baby Buddy offers opportunities for re-thinking and re-structuring the way antenatal education is delivered. With rich material covering the period from early pregnancy to the first six months of the baby's life, it offers a low-cost high-quality alternative to the current lack of educational material, especially as it is available in four additional languages (English, Turkish, Arabic and Russian). Material can be used as part of formal activities (i.e. antenatal class) but, as a digital tool, it is particularly suited in assisting the educational role during routine appointments, characterized by limited time (e.g. recommending certain videos or articles). Use of Baby Buddy would allow to structure a meaningful conversation during consultation while transcending physical barriers (e.g. unsuitable spaces, privacy issues). Furthermore, Baby Buddy resources can also be used independently from the platform to affect Automatic Motivation e.g. videos playing in waiting rooms' monitors and/or FAQs provided as conventional leaflets. This type of use may hold the potential to provide cues for parents-to-be to initiate a conversation as well as memory triggers for providers to engage in antenatal education. To this end, maternity clinics can be further enhanced with adding objects at the point-of-care, such as Baby Buddy avatars, posters, leaflets and cards.

Training, modelling and incentivization through Service Provision

As the only state-funded University with a Midwifery programme, a training service could be provided to strengthen the skills and competences needed to be an 'educator'. This should include experiential skills e.g. in-hospital practical training on how to engage with pregnant women using Baby Buddy. As attentional control is influenced by workload demands, a necessary component of training is reinforcing the self-belief that the activity can be performed and arguing against self-doubts. Furthermore, the University can affect change through its clinical training and the selection of mentors. In fact, the role of mentors was one of the key elements identified for inducing motivation and strengthening the sense of professional identity. Experienced midwives can participate in a "*Baby Buddy Champions*" train-the-trainer programme. Other than a social reward for the first trainers through peer-recognition, the programme can offer tangible incentives for other midwives completing the training through accreditation by the Cyprus Nurses and Midwives Association, a necessary requirement for renewal of registration. Baby Buddy Champions can provide "credible role models" in practice as well as on video. "Best practice" examples can feature in the Baby Buddy video library to induce a cognitive shift in providers and service users alike by providing observable examples of user-provider communication.

Modelling and persuasion through communication and marketing

Many of the problematic areas relate to the prevailing socio-cultural norms, mainly as a consequence of the medicalization of birth. Cultivating reflection on attitudes and beliefs around the professional role, identity and status of midwives in Cyprus may be necessary. It might be useful to suggest the deliberate adoption of a new perspective on antenatal education and further influence positive emotions around claiming the education role as key in showcasing the autonomous role of the midwife. Drawing attention may be needed to discrepancies between current practices and self-identification as proponents of the women's' rights to Respectful Maternity Care. Through persuasive communication, it might also be necessary to re-frame the concept of antenatal education from a highly structured formal activity in physical space (i.e. the "antenatal class", currently the norm) to promoting the concept of "*making every contact count*". Baby Buddy can be framed as a solution to some perceived barriers as well as anticipated regrets stemming from potential inter-professional group power conflicts. The latter is particularly suitable since Baby Buddy material was co-created in consultation with all national scientific bodies. Nevertheless, highlighting social approval might also be important through, for example, statements by professional leaders about the central role of midwives and/or testimonials promoted on Baby Buddy's and other social media platforms about the positive experience of pregnant women with their midwife. A communication and marketing strategy using a variety of media could be directed towards midwives themselves but also the public aiming at highlighting the role of the midwife as the 'educator' and promoting antenatal education as a "window of opportunity" for promoting the health and well-being of the whole family.

Discussion

Main findings

Midwives view antenatal education as a core function of their role; yet it is not prioritized nor supported by current practices. The medicalization of birth is alienating midwives who nevertheless view the educational role as a means to enhance the autonomy of the profession. Enablement (e.g. Baby Buddy material) and environmental restructuring (e.g. prompts and triggers), training (e.g. skills strengthening), incentivization (e.g. continuous education accreditation) and persuasion (e.g. reflection on professional identity) were identified as promising intervention functions. Modelling may also be necessary both for providing "credible models" for the role itself as well as re-framing antenatal education through the concept of '*making every contact count*'.

Strengths and limitations

The use of both COM-B and TDF to guide data collection and analysis offered a structured approach in identifying and classifying influences on the target behaviour. The complimentary nature of the three studies allowed method and informant triangulation (in-training and registered midwives). While data saturation was reached, it is unclear whether theoretical saturation was achieved due to the purposive sample of the focus group and voluntary participation in the workshop. Participants may represent a motivated group while a more heterogeneous sample may have identified additional barriers and/or facilitators. Even though the survey sample is small, it allowed piloting the questionnaire before the launch of a larger paper-form survey which is currently on-going across maternity clinics. This will provide the opportunity to assess the consistency of the findings with a representative sample of midwives. Finally, as the findings also indicate, midwives' practices are influenced by the behaviour of other actors (other providers and pregnant women) and organizational factors (clinic policies and leadership). Thus, future studies could approach the issue as a complex adaptive system.

Perceived barriers and facilitators related to midwives' educational role

Barriers to midwives' educational role are likely to be topic- (e.g. smoking cessation versus mental health screening), healthcare system- (e.g. status of midwifery) and context- (e.g. low versus high-resource setting) specific, thus, making comparison of findings across international settings difficult. The rapid review (study D) identified fifteen studies published in 2012–2020, originating from a small number of settings; five from the UK, six from Australia and four from New Zealand, Canada, Tanzania and Uganda (see *Additional file 5*). Seven used predominantly qualitative methods to collect information, such as focus groups, interviews or written responses [29–36]. Four employed a paper-based or online questionnaire survey with varying number of items (N = 40–56) [37–40] and three mixed-methods [25, 41, 42]. Qualitative and mixed-method studies employed the COM-B [30, 31, 41, 42] or the TDF [25, 29, 32–36] to inform the interview guide and code the material.

The majority of studies do not address the education and/or health promotion role of midwives in general but focus on exploring barriers to implementing a specific policy, programme or intervention; for example, smoking cessation support [32, 37, 40], advice for physical activity [30], alcohol [38] or nutrition [29], place of birth discussions [41], Down syndrome prenatal screening [34], antenatal Corticosteroid Clinical Practice guidelines [35] and antenatal magnesium sulphate for fetal neuroprotection guidelines [36]. A number of studies focus on special population groups, such as obese pregnant women [39], indigenous women [42] and women with refugee background [33].

The study by McLellan et al (2019) is more similar to the current study in terms of aims [25]. Focusing on multiple health promotion practice behaviours (termed, HePPBes), the authors performed semi-structured interviews with eleven community midwives, followed by an online survey. Similar to our findings, the authors identified that UK midwives hold strong beliefs about the importance of health promotion and their own role. Clinical work overload, lack of continuity of care, quality of the relationship with pregnant women and lack of training also emerged as some of the main barriers, even though, unlike Cyprus, the role of the midwife as a Public Health Practitioner is institutionalized in the UK.

Lack of time, competing priorities and/or insufficient resources (Physical Opportunity: Context and Resources) in parallel with weak procedural or specialized knowledge and insufficient practical skills training opportunities (Psychological Capability: Knowledge and Skills) are factors which consistently emerge across studies irrespective of whether they originate from a higher- or lower-resource setting. Thus, strengthening skill training is a common suggestion across studies, as is enablement and environmental planning with providing the necessary resources, in the form of material and tools to facilitate the task (e.g. information leaflets, check lists), increase habit or performance (e.g. audits and feedback) and/or provide prompts and cues to deal with attentional control.

Implications for future research and practice

While digital tools have the potential to transform antenatal education, effective and motivated antenatal educators are needed in order to successfully embed digital tools in clinical and community practice. Baby Buddy can assist in the performance of the educational role by increasing the means (i.e. lack of educational material) and reducing barriers (e.g. physical and linguistic), thus impacting *Capability* and *Opportunity* to perform the role in a suboptimal setting and context. However, action in the first instance should be directed towards improving the necessary skills to competently perform this role.

The proposed intervention was shaped on the basis of expert panel consensus. This will need to be refined and adapted based on an assessment of appropriateness and feasibility among the actual target group. Other than some notable exceptions, very few studies incorporate an explicit process of intervention mapping involving the target group. Henshall et al (2018) engaged with midwives in co-creation workshops to evaluate potential interventions to strengthen the quality and content of place of birth discussions [41]. Similarly, Campbell et al (2017) engaged in a participatory process in order to select promising interventions to improve postpartum diabetes screening among Indigenous women with gestational diabetes [42].

An initial assessment of the various intervention components according to the APEASE criteria identified a number of issues and possible unintended consequences in the context of scalability, sustainability and acceptability. For instance, affecting a cognitive shift in the role of midwives would be limited if this role is not institutionally supported, especially in the private sector which represents over 70% of births in Cyprus but differing levels of autonomy create differential conditions of applicability. Efforts should also concentrate on developing guidelines and protocols in collaboration with professional associations through a similar academia-led participatory action process used to shape the content of Baby Buddy. Furthermore, advocacy efforts are needed towards strengthening the professional role of midwives, for instance (a) enforcement of current legislation on minimum staff requirements in maternity clinics and (b) improved direct access to midwives in terms of number of visits (currently only six) and range of services reimbursed by the newly established General Healthcare System (GeSY).

Conclusions

Barriers to being an effective antenatal educator are several, originating from an unsupportive system and wider socio-cultural norms pertaining to users and providers. Through a theory-driven research-informed process, the study identified various components necessary to impact change through better-prepared, better-equipped and better-received midwives.

List Of Abbreviations

AE
Antenatal education
BCTs
Behaviour Change Techniques
BCW
Behaviour Change Wheel
COM-B
Capability, Opportunity, Motivation-Behaviour
COREQ
COnsolidated criteria for REporting Qualitative studies
GeSY
General Health System [in Greek]
HP
Healthcare providers
PAR
Participatory Action Research
RM
Registered Midwife/ves
StaRI
Standards for Reporting Implementation studies
TDF

Theoretical Domains Framework
WHO
World Health Organization

Declarations

Ethics approval and consent to participate

Study protocols were approved by the Cyprus National Bioethics Committee (reference numbers: EEBK EP 2017.01.152 and EEBK EP 2021.01.61). The study was performed in accordance with the Declaration of Helsinki. Information about the purpose and processes of the study were provided to all participants, who provided informed consent before participating in either face-to-face focus group/workshop sessions and/or the online survey.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published article and its supplementary information files and/or are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

NM (Public Health researcher), EH (academic midwife), VC (adult educator) and AB (CEO and Founder of Best Beginnings, creator of original Baby Buddy UK) conceived and designed the methodology and protocol of the present study. All other authors (OK, IK, CN, MP, CK and MK) contributed to the refinement of the methodology and participated in the implementation of the study either in designing of study tools and materials and/or data collection and/or analysis and/or interpretation and/or delivery of workshops and/or intervention mapping. NM is Scientific Coordinator of the Baby Buddy Forward programme and responsible for the overview of the research process and supervision of all related activities. OK (Pediatrician) is Chair of the Scientific Advisory Committee of Birth Forward, project partner of Baby Buddy Forward and VC is CEO of Birth Forward and Project Manager of Baby Buddy Forward. NM, EH and MK performed the focus group and qualitative analysis of the data and all authors contributed to the interpretation and the subsequent intervention mapping. NM, EH, VC, CN, MP and CK (midwifery, community nursing and public health educators and researchers) prepared the material, delivered, coordinated and analysed the findings from the participatory learning workshops. NM and IK (doctoral student) performed the rapid literature review. NM performed the quantitative analysis of the survey data, collated the findings from all three studies and the intervention mapping exercise and prepared the first draft of the manuscript. All authors reviewed and critically revised the manuscript. All authors have read and approved the final version of the manuscript.

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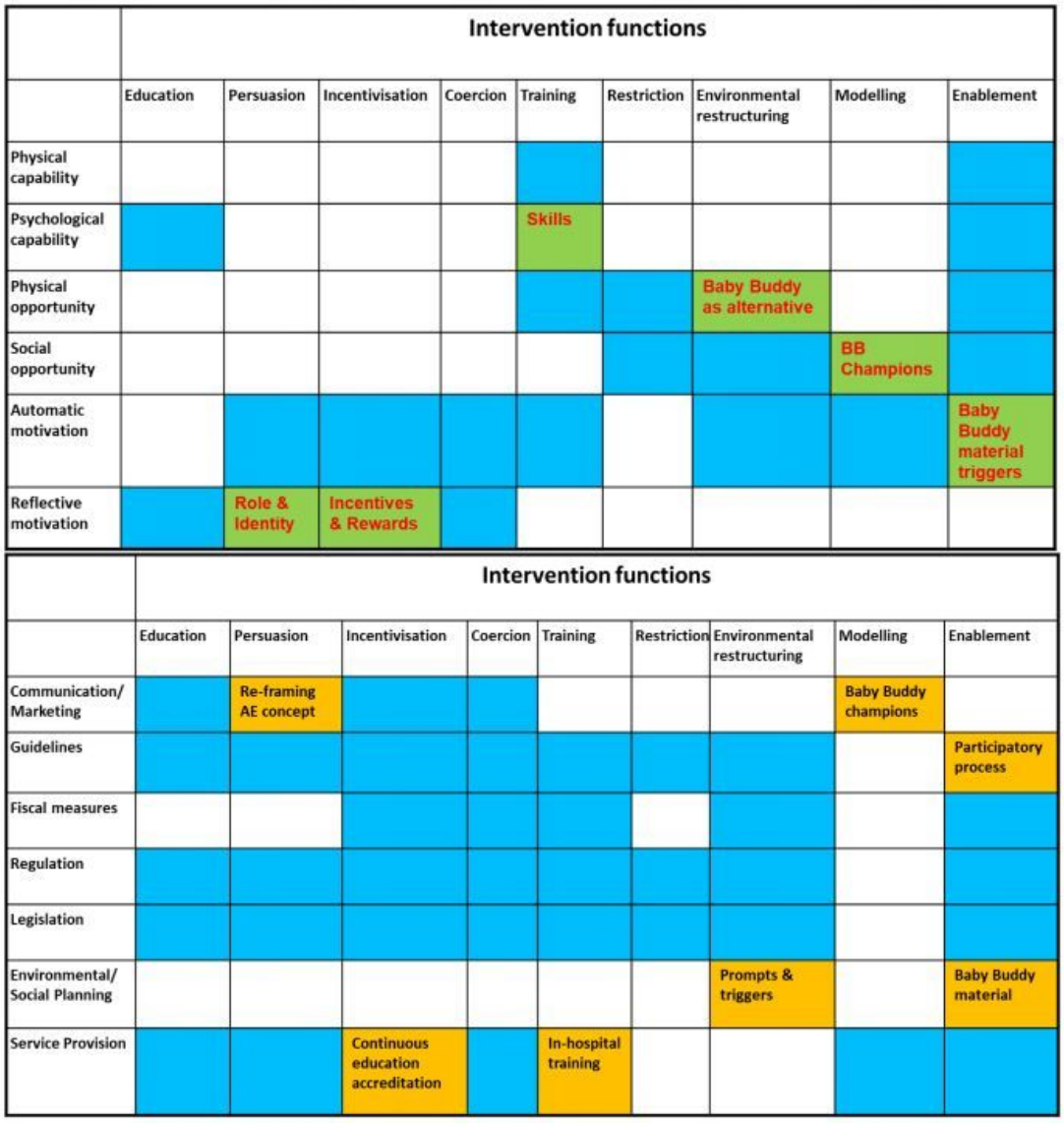
Figures



	Intervention functions								
	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Physical capability									
Psychological capability					Skills				
Physical opportunity							Baby Buddy as alternative		
Social opportunity								BB Champions	
Automatic motivation									Baby Buddy material triggers
Reflective motivation		Role & Identity	Incentives & Rewards						

	Intervention functions								
	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Communication/ Marketing		Re-framing AE concept						Baby Buddy champions	
Guidelines									Participatory process
Fiscal measures									
Regulation									
Legislation									
Environmental/ Social Planning							Prompts & triggers		Baby Buddy material
Service Provision			Continuous education accreditation		In-hospital training				

Figure 1

Matrices of selected intervention functions and related policy categories.

Key: First matrix: Blue squares represent the most commonly used interventions for each of the six domains of the COM-B. Green squares denote the selected intervention functions based on the behaviour diagnosis. Second matrix: Blue squares represent the available policy categories to deliver each of the intervention functions according to the Behaviour Change Wheel. Orange squares denote the chosen policy categories.

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