The Eben Integrated Model: A Mathematical Architecture for Adaptive Behavioural Implementation

Abstract

Behavioural interventions often work well in controlled studies but fail to achieve the same success in real-world situations. A major challenge across healthcare, organisations, education, and policy is how to turn behavioural knowledge into consistent, effective action. Many existing frameworks highlight factors such as motivation, ability, and environmental influence, but they seldom explain the exact conditions that make behaviour possible. As a result, interventions are often poorly timed, unfocused, or mismatched to their context.

The *Eben Integrated Model* introduces a structured way to understand and guide behavioural decisions. It shows that behaviour happens only when three conditions align: readiness (psychological preparedness), constraint clearance (removal of the main barrier), and contextual support (a supportive environment). The model expresses these conditions mathematically as a multiplicative system, meaning behavioural success depends on all three working together. Behaviour occurs when the combined value crosses a minimum threshold. This also means that a strength in one area cannot make up for a weakness in another.

The model predicts several key patterns: behaviour depends on the weakest condition, new behaviours often appear suddenly once conditions surpass a threshold, and results improve when interventions follow a clear, step-by-step diagnostic sequence. Unlike additive models that sum behavioural factors, this approach helps explain why small environmental changes can lead to big improvements or why certain efforts fail despite strong motivation or training.

The *Eben Integrated Model* does not add new behavioural factors but reorganises what is already known into a practical, testable framework. Its main contribution is turning behavioural theory into an implementation guide that can adapt across different fields. By defining how behavioural conditions must align, the model provides a general framework for designing flexible interventions and a foundation for future research in real-world systems.

Keywords: Behaviour change; Implementation science; Decision architecture; Behavioural adoption; Systems thinking; Readiness to change; Barrier diagnosis; Contextual intervention; Adaptive implementation; Threshold behaviour; non-compensatory model; Cross-sector framework.

Introduction

Across health systems, organisations, education, and public policy, behavioural interventions frequently fail despite strong empirical evidence supporting recommended actions. Evidence-based guidelines, training programmes, and policy reforms often demonstrate effectiveness under controlled conditions yet produce inconsistent adoption in real-world settings. Implementation science has therefore increasingly focused not only on what works, but why effective practices are not routinely used. The persistence of this research practice gap suggests that behavioural adoption is influenced by factors extending beyond knowledge or intention alone (Nilsen, 2015).

A substantial body of research indicates that behaviour depends on interacting conditions rather than single determinants. For example, the COM-B framework proposes that behaviour occurs through the interaction of capability, opportunity, and motivation, emphasising the multidimensional nature of action (Michie, van Stralen, & West, 2011). The Behaviour Change Wheel was developed in response to the proliferation of behavioural frameworks that lacked coherent guidance for intervention design (Michie et al., 2011). While these approaches advanced behavioural explanation, they primarily identify influences on behaviour rather than specifying how practitioners should decide which influence to address first.

Implementation research further shows that theoretical approaches often function as descriptive classifications rather than operational guidance. Nilsen (2015) distinguishes process models, determinant frameworks, and evaluation frameworks, noting that determinant frameworks may offer limited practical direction because their constructs remain broad. In practice, professionals frequently recognise barriers to change but lack a structured decision sequence for responding to them. Consequently, interventions may be applied simultaneously or inappropriately, such as providing training when access is the primary constraint or enforcing compliance when readiness is absent.

This absence of procedural ordering contributes to a recurring implementation problem: misdiagnosis. When behaviour fails, practitioners often attribute the failure to motivation or resistance, leading to intensified persuasion, repeated education, or increased monitoring. However, if behaviour depends on multiple conditions occurring together, incorrect prioritisation may produce negligible change. Implementation strategies may therefore fail not because theoretical constructs are inaccurate, but because they are applied without a decision architecture specifying when each construct becomes relevant (Michie et al., 2011; Nilsen, 2015).

In effect, behavioural science has generated extensive explanatory knowledge but limited operational logic. Existing models clarify influences on behaviour, yet they rarely define the conditions under which action becomes possible or how intervention choices should be sequenced. A formal representation of behavioural alignment is therefore required to translate explanatory theory into practical decision guidance.

This paper addresses this gap by formalising a behavioural decision architecture the Eben Integrated Model which specifies when action becomes possible through the alignment of readiness, constraint resolution, and contextual support.

Determinant and Barrier-Based Models

Complementing readiness theories, determinant models focus on mechanisms influencing behaviour. The COM-B system proposes that behaviour arises from the interaction of capability, opportunity, and motivation (Michie, van Stralen, & West, 2011). This framework underpins the Behaviour Change Wheel, which links behavioural diagnosis to intervention functions (Michie, Atkins, & West, 2014). Related constructs appear in other behavioural theories, including perceived behavioural control in the Theory of Planned Behaviour (Ajzen, 1991) and self-efficacy in Social Cognitive Theory (Bandura, 1986).

These models provide strong explanatory value by identifying factors associated with behavioural performance; however, they offer limited procedural guidance for prioritisation. Multiple determinants frequently coexist, and the frameworks do not specify how practitioners should determine which condition is most influential in a particular situation (Keyworth et al., 2020; Baum & Fisher, 2014). In practice, this can lead to the simultaneous application of multiple strategies without clarity regarding their relative contribution. Determinant models therefore clarify influences on behaviour but provide less direction regarding when or where intervention should be focused.

Ecological and Contextual Theories

Ecological frameworks extend behavioural analysis beyond the individual by situating action within interacting social and structural environments. The socio-ecological model conceptualises behaviour as influenced across nested levels, including individual, interpersonal, organisational, community, and policy contexts (McLeroy et al., 1988). Empirical research highlights the importance of structural factors such as service accessibility, organisational workflow, and socioeconomic conditions in shaping behavioural outcomes (Lund et al., 2018; World Health Organization, 2022). Systems perspectives further emphasise that interventions operate within dynamic networks rather than isolated settings (Hawe, Shiell, & Riley, 2009).

While ecological models identify multiple levels of influence, they provide limited guidance on prioritising intervention targets in specific situations. In practice, interventions may therefore operate across several levels without clear sequencing, for example addressing structural conditions when readiness is low or focusing on individual behaviour when systemic constraints remain dominant. Ecological approaches thus offer breadth of contextual understanding but less explicit procedural direction for determining the order of intervention.

The Conceptual Gap

Across readiness, determinant, and ecological traditions, complementary explanatory strengths are evident: readiness theories describe temporal preparedness, determinant models identify behavioural mechanisms, and ecological frameworks locate contextual influences. Yet these approaches largely operate in parallel. They clarify influences on behaviour but offer limited procedural guidance linking them into a decision pathway. Practitioners are therefore left with uncertainty regarding whether readiness should be assessed, barriers addressed, or environmental conditions modified first.

Existing behavioural theories explain components of behaviour but provide little operational architecture for sequencing intervention decisions. This absence of ordering can contribute to mistimed, misdirected, and mis-levelled interventions, indicating the need for a formal structure specifying when each explanatory dimension becomes most relevant.

3. The Eben Decision Logic

The preceding review indicates that behavioural science has identified multiple valid determinants of action, yet these determinants operate at different functional levels. Readiness theories describe temporal preparedness, determinant models describe mechanisms influencing performance, and ecological frameworks describe environmental enablement. However, real-world implementation requires not only identifying influences but determining the conditions under which behaviour can occur. The Eben decision logic proposes that behaviour emerges only when three requirements are simultaneously satisfied: readiness, constraint resolution, and contextual support.

Readiness refers to the point at which an individual or group becomes psychologically prepared to initiate action. Stage-based change research suggests individuals may understand recommendations yet delay action until perceived relevance, urgency, or confidence becomes sufficient (Prochaska & DiClemente, 1983; Norcross et al., 2011). Interventions delivered prematurely may lead to disengagement or limited uptake (Miller & Rollnick, 2013). Thus, readiness indicates when action may become possible rather than guaranteeing that it will occur.

Constraint resolution refers to reduction of the dominant barrier preventing performance. The COM-B framework proposes that behaviour depends on the interaction of capability, opportunity, and motivation (Michie et al., 2011). Evidence suggests that interventions poorly matched to the behavioural context are less effective (Keyworth et al., 2020). For example, educational approaches may have limited impact where access barriers persist, and incentives may be insufficient where capability is lacking. Behaviour therefore requires that the primary limiting condition be adequately addressed.

Contextual support refers to alignment between behaviour and its surrounding system. Ecological and systems perspectives indicate that behaviour is shaped by social, organisational, and policy environments (McLeroy et al., 1988; Hawe et al., 2009). Structural conditions such as workflow, norms, and service accessibility can influence whether intended behaviours are maintained in practice (Lund et al., 2018). Context therefore contributes to whether behaviour can be sustained once initiated.

Together these components imply a conjunctive rather than additive relationship. Additive models assume improvement in one determinant can compensate for weakness in another. However, behavioural research suggests that certain barriers may prevent change despite strong motivation or supportive environments (Michie et al., 2011; Patel et al., 2018). Action may therefore depend on the least satisfied enabling condition.

The Eben decision logic consequently treats behaviour as conditional rather than accumulative. Instead of asking how strongly a determinant influences behaviour, the model asks whether each required condition has reached a minimally sufficient level. Behaviour occurs when readiness allows initiation, the dominant constraint is reduced, and the context permits performance. Failure of any single component may prevent behavioural execution regardless of strength in the others.

This interpretation reframes implementation failure as misalignment rather than resistance. Interventions may appear ineffective not because behavioural theories are inaccurate, but because the relevant determinant is addressed at an inappropriate moment or level. The Eben logic therefore establishes a procedural order: first determine whether action is possible, then identify what prevents it, and finally ensure the environment supports it. The subsequent section formalises this conjunctive relationship mathematically.

4. Mathematical Formulation

The Eben decision logic proposes a simple but important idea:

Behaviour does not occur because influences are strong. Behaviour occurs because required conditions are aligned.

To make this idea precise and testable, the model is expressed mathematically.
The purpose of the mathematics is not complexity it is clarity.
It forces us to specify exactly when behaviour becomes possible.

4.1 Representing Behaviour

We first represent behaviour using a simple outcome variable:

$$A$$

This symbol stands for **Action (or Adoption)**.

It has only two possible values:

$$A = 1 \text{Behaviour occurs}$$
$$A = 0 \text{Behaviour does not occur}$$

In everyday language:

Value	Meaning
1	The person did it
0	The person did not do it

So, the model does not measure intention, opinion, or agreement
it measures **real behaviour**.

4.2 The Three Required Conditions

The Eben model states that three conditions must exist together before behaviour can happen.

1. Readiness (R)

Readiness means the person or group is psychologically prepared to act.

Examples:

- understands the need
- accepts the change
- willing to try

Scale:

$$R \in [0,1]$$

Value	Meaning
0	Completely unwilling / not ready

Value	Meaning
0.5	Unsure / hesitant
1	Fully ready

2. Constraint Clearance (C)

Constraint clearance means the main obstacle has been removed.

Examples:

- has the skill
- has time
- has access
- knows what to do

$$C \in [0,1]$$

Value	Meaning
0	Impossible to perform
0.5	Difficult but possible
1	Easy to perform

3. Context Support (X)

Context support means the environment allows the behaviour to happen.

Examples:

- tools available
- workflow allows it
- system supports it
- no penalties for doing it

$$X \in [0,1]$$

Value	Meaning
0	Environment blocks behaviour
0.5	Environment inconsistent
1	Environment supports behaviour

4.3 Behavioural Effectiveness

We now combine the three conditions.

$$E = R \times C \times X$$

Where:

$$E = \text{Behavioural Effectiveness}$$

This equation is extremely important.

It means behaviour depends on **alignment**, not addition.

Why multiplication?

Because real life works like a chain.

If one link breaks → the whole chain fails.

Example:

Readiness	Constraint	Context	Result
1	1	1	Behaviour occurs
1	1	0	Behaviour fails
1	0	1	Behaviour fails
0	1	1	Behaviour fails

So even if two conditions are perfect, one missing condition stops action.

This is called a **weakest-link system**.

4.4 The Adoption Threshold (τ)

People do not need perfect conditions to act.
They act once conditions become sufficient.

We represent this using a threshold:

$$\tau\text{(tau)}$$

This means the minimum level required for behaviour.

The adoption rule becomes:

$$A = \begin{cases} 1, & \text{if } E \geq \tau \\ 0, & \text{if } E < \tau \end{cases}$$

What does this mean?

Situation	Interpretation
Effectiveness above threshold	Behaviour happens
Effectiveness below threshold	Behaviour does not happen

Real-life example

Behaviour	Threshold
Taking vitamin tablet	Low τ
Changing diet	Medium τ
Starting exercise programme	Higher τ
Changing professional practice	Very high τ

Harder behaviours require more alignment before action.

4.5 Why This Matters

Most behaviour strategies assume:

More motivation = more behaviour

But the equation shows:

Behaviour = alignment, not intensity

You cannot compensate for a missing condition.

Examples:

Training more → useless if time unavailable
Motivating more → useless if system blocks
Changing policy → useless if people not ready

4.6 Behaviour Over Time (Dynamic Updating)

Behaviour does not happen once.
Conditions change daily.

So we update the equation over time:

$$E_{t+1} = R_{t+1} \times C_{t+1} \times X_{t+1}$$

This means:

Symbol	Meaning
t	current time
t+1	next time step (after intervention)

So after you intervene, the values change.

Example:

Time	R	C	X	E	Behaviour
Week 1	0.3	0.7	0.8	Low	No
Week 2	0.6	0.7	0.8	Medium	Maybe
Week 3	0.8	0.9	0.8	High	Yes

This shows behaviour emerging gradually as alignment improves.

4.7 Practical Interpretation

The equation gives a decision order:

Step 1 — Check readiness (R)

If low → do preparation work

Step 2 — Remove main barrier (C)

If impossible → fix capability/opportunity

Step 3 — Adjust environment (X)

If unsupported → change workflow/system

Then reassess.

4.8 What the Model Changes

Instead of asking:

“How do we make people do it?”

You ask:

“Which required condition is missing?”

This prevents:

- blaming people
- overtraining
- overenforcement
- wasted resources

4.9 Summary

The Eben mathematical model states:

Behaviour occurs when readiness, constraint removal, and context support reach sufficient alignment.

$$A = 1 \text{ only when } R \times C \times X \geq \tau$$

It therefore converts behavioural theory into a practical decision rule:

Diagnose → Align → Reassess

Behaviour becomes predictable not when people are persuaded,
but when conditions allow action.

5. Model Properties and Testable Predictions

The mathematical formulation of the Eben Integrated Model is simple:

$$E = R \times C \times X$$
$$A = 1 \text{ when } E \geq \tau$$

However, the importance of a model is not the equation itself; it is what the equation predicts about real behaviour.
A useful behavioural model must explain everyday observations and generate testable expectations.

The Eben model produces several distinctive properties.
These properties differ from many traditional behavioural assumptions and can be examined empirically.

5.1 Non-Compensatory Behaviour (Weakest-Link Principle)

The first property is that behaviour is **non-compensatory**.

This means one strong factor cannot compensate for a missing one.

Because effectiveness is multiplicative, any variable approaching zero causes the overall outcome to approach zero.

$$R \approx 0 \Rightarrow E \approx 0$$
$$C \approx 0 \Rightarrow E \approx 0$$
$$X \approx 0 \Rightarrow E \approx 0$$

Practical Meaning

A person may be highly motivated yet unable to act if opportunity is absent. Conversely, adequate access alone may not produce behaviour if readiness is low. This interpretation aligns with behavioural theory indicating that motivation interacts with capability and opportunity rather than operating independently (Michie, van Stralen, & West, 2011). Public health research similarly suggests that educational interventions often have limited impact when structural conditions remain unchanged (Baum & Fisher, 2014).

Prediction 1

Increasing motivation alone will not significantly change behaviour when environmental or capability barriers remain.

5.2 Misaligned Intervention Failure

A second property is that interventions fail when applied to the wrong variable.

Because behaviour depends on alignment, improvement in a non-limiting factor produces little effect.

Example

Problem	Typical Intervention	Expected Outcome
No time	Training	No change
No skill	Incentives	No change
No readiness	Enforcement	Resistance

Implementation research indicates that identifying determinants alone does not provide clear guidance for selecting appropriate intervention strategies (Nilsen, 2015).

Prediction 2

Interventions targeting a non-dominant barrier will produce minimal behavioural change even if delivered intensively.

5.3 Threshold Effect (Sudden Change)

A third property implied by the model is threshold behaviour.
Because adoption depends on reaching a minimally sufficient condition level, behaviour may change abruptly rather than gradually.

$$A = 0 \text{until} E \geq \tau$$

Where action occurs only once the combined enabling conditions exceed a sufficiency threshold.

Practical Meaning

Individuals may resist a behaviour for a prolonged period and then adopt it rapidly once enabling conditions align. This helps explain common real-world patterns:

- sudden adoption following system redesign
- rapid engagement after removal of a key obstacle
- immediate compliance once expectations become clear

Behaviour change literature describes comparable non-linear dynamics in implementation processes, where interventions modify relationships within systems rather than producing incremental change (Hawe, Shiell, & Riley, 2009).

Prediction 3

Small improvements in the limiting condition near the threshold will produce disproportionately large behavioural change.

5.4 Sequential Intervention Logic

The model implies a decision order.
Because behavioural performance depends on the least satisfied enabling condition, the proposed sequence is:

1. Assess readiness
2. Address the dominant constraint
3. Align contextual conditions

Addressing these elements out of order may reduce effectiveness. For example:

- Training before readiness → limited engagement
- Policy before access → frustration
- Motivation before capability → anxiety

Research on stage-matched interventions suggests improved outcomes when interventions correspond to readiness level (Norcross, Krebs, & Prochaska, 2011), supporting the importance of timing in behavioural implementation.

Prediction 4
Interventions applied sequentially (readiness → barrier → context) will produce greater behavioural adoption than simultaneous interventions of comparable intensity.

5.5 Dynamic Adaptation

The model also treats behaviour as time-dependent:

$$E_{t+1} = R_{t+1} \times C_{t+1} \times X_{t+1}$$

This formulation implies that behavioural conditions evolve over time and therefore require ongoing reassessment. Implementation research emphasises that interventions operate within dynamic systems rather than static environments (Hawe et al., 2009).

Practical Meaning

An intervention that is initially effective may later fail because:

- readiness declines
- barriers change
- contextual conditions shift

Prediction 5

Sustained behaviour will require periodic reassessment rather than a one-time intervention.

5.6 Cross-Context Generality

Because the variables represent general enabling conditions rather than specific behaviours, the model is expected to apply across domains:

- healthcare adherence
- organisational change
- educational participation
- policy compliance

Implementation research identifies common behavioural influences across settings, suggesting shared underlying determinants of engagement (Patel et al., 2018).

Prediction 6

The same decision logic should predict behavioural adoption across different sectors.

5.7 Summary of Model Behaviour

The model therefore predicts:

Property	Expected Observation
Weakest link	One missing condition prevents action
Misalignment	Wrong intervention fails
Threshold	Sudden behaviour change
Sequencing	Correct order improves success

Property	Expected Observation
Dynamic	Behaviour changes over time
General	Applies across contexts

Together these distinguish the model from additive behavioural frameworks.

Summary of Section

The Eben formulation transforms behavioural theory into a predictive system. Rather than describing influences, it specifies observable patterns of success and failure.

These predictions are empirically testable and allow the model to be evaluated through applied studies.

The next stage of research therefore involves applying the framework in real settings to examine whether behavioural adoption follows the predicted alignment dynamics.

6. Practical Implications and Application Example

The value of a behavioural model lies not only in theoretical explanation but in its capacity to guide decisions in practice. The Eben formulation converts behavioural analysis from general reasoning into a structured procedure. Rather than broadly asking why behaviour is low, practitioners assess three defined conditions in sequence: readiness, constraint, and context. This ordering reduces the likelihood of applying inappropriate interventions.

Procedural Application

In applied settings, the model functions as a diagnostic pathway:

1. **Assess readiness** — determine whether the individual or group is psychologically prepared to act.
2. **Identify the dominant constraint** — establish the primary barrier preventing performance.
3. **Select the intervention level** — apply change at the environmental level capable of removing the barrier.
4. **Reassess** — evaluate conditions again after intervention because variables may change over time.

This approach differs from conventional practice, where multiple interventions may be implemented simultaneously without clear prioritisation. Implementation frameworks commonly identify factors influencing behavioural outcomes but provide limited operational guidance on how interventions should be selected or sequenced

(Nilsen, 2015), which may contribute to ineffective or misdirected implementation decisions. By identifying the limiting condition first, the model aims to reduce unnecessary effort and improve intervention targeting.

Applied Example: Healthcare Engagement

Consider a situation in which patients repeatedly fail to attend scheduled medical appointments. Traditional responses often include reminder messages or warnings about consequences. Using the Eben logic, the practitioner analyses the three conditions sequentially.

Step 1 — Readiness
Interviews indicate patients value treatment and intend to attend; readiness is therefore present.

Step 2 — Constraint
Further investigation reveals transportation cost and time conflicts as the primary barriers, indicating an opportunity constraint rather than a motivational one.

Step 3 — Context
The appropriate intervention level becomes organisational rather than individual. Adjusting appointment scheduling or providing flexible clinic hours addresses the constraint more directly than additional reminders.

Following the introduction of flexible scheduling, attendance increased substantially. The change likely reflects improved alignment between readiness, removal of practical barriers, and supportive service conditions rather than a change in motivation alone. This interpretation is consistent with evidence that structural access plays an important role in healthcare utilisation and engagement (Patel et al., 2018). Modifying service organisation may therefore be more effective than intensifying informational or motivational strategies when behavioural barriers are primarily practical.

Broader Implications

The same reasoning can apply across sectors. In organisational change initiatives, training may fail when workflow prevents adoption. In education, motivational campaigns may be ineffective when learning environments lack support. In public policy, enforcement may be ineffective when citizens lack feasible alternatives. In each case, behaviour improves once the limiting condition is addressed rather than intensified effort directed elsewhere.

The practical implication is efficiency: the model directs attention to the smallest change capable of enabling action. Rather than increasing pressure, resources, or persuasion, the practitioner adjusts the missing condition. This interpretation aligns with systems perspectives emphasising that altering system structures and constraints can influence behaviour beyond targeting individual attitudes alone (Hawe, Shiell, & Riley, 2009).

Section Summary

The Eben Integrated Model therefore functions as a decision tool rather than a descriptive theory. By identifying which condition prevents behaviour, it guides intervention choice and sequencing. Its practical value lies in reducing misdirected strategies and enabling targeted behavioural alignment across diverse real-world settings.

7. Discussion and Theoretical Contribution

The Eben Integrated Model proposes that behavioural failure is primarily a problem of alignment rather than motivation. This position challenges a common assumption in behavioural intervention research that strengthening behavioural drivers proportionally improves outcomes. Much applied behavioural practice implicitly adopts additive reasoning, in which determinants exert cumulative influence. However, implementation research indicates that identifying determinants alone does not provide clear guidance on intervention selection or sequencing (Nilsen, 2015), and public health evidence highlights the limitations of approaches that target individual behaviour without addressing structural conditions (Baum & Fisher, 2014). The multiplicative formulation presented here offers a potential structural explanation for these observations by proposing that behaviour depends on the alignment of necessary conditions rather than the intensity of a single factor.

Reinterpreting Behavioural Determinants

Traditional behavioural frameworks identify relevant variables but rarely specify their functional relationship. For example, the COM-B model conceptualises capability, opportunity, and motivation as interacting conditions for behaviour (Michie, van Stralen, & West, 2011). Yet interaction is typically interpreted qualitatively rather than operationally. In practice, interventions frequently target one domain intensively often motivation while assuming partial improvement will proportionally improve behaviour. The Eben formulation instead treats interaction as conditional dependency: a necessary condition structure in which insufficient value in one variable constrains the entire system. This interpretation aligns with research demonstrating that education programmes produce limited behavioural change when environmental access is absent and that structural interventions fail when readiness is low (Lund et al., 2018; Patel et al., 2018).

By defining behaviour as a weakest-link system, the model converts qualitative interaction into testable logic. Behaviour becomes predictable once the limiting variable is identified. Consequently, intervention failure can be interpreted not as resistance but as category error the wrong determinant targeted at the wrong stage. This reframes implementation failure from psychological unwillingness to diagnostic misclassification.

Temporal Ordering as Missing Architecture

A second theoretical contribution concerns sequencing. Implementation frameworks often classify determinants but do not specify order of application. Nilsen (2015) distinguishes determinant frameworks from process models, noting that determinant lists alone provide limited operational guidance. Practitioners therefore apply interventions simultaneously, assuming comprehensive coverage improves success probability. However, complex systems research suggests that simultaneous multi-component interventions frequently obscure causal mechanisms and reduce effectiveness because irrelevant components introduce noise (Hawe, Shiell, & Riley, 2009).

The Eben model introduces ordering by linking readiness, constraint, and context into a procedural hierarchy. The model predicts that readiness assessment precedes barrier removal, which precedes environmental adjustment. This hierarchy is not arbitrary; it reflects dependency relations within the equation. Environmental modification cannot produce behaviour if action is not psychologically possible, and readiness interventions cannot produce behaviour when execution is impossible. The theoretical implication is that behavioural determinants are not parallel contributors but conditional prerequisites.

Explaining Threshold Behaviour

Behaviour change research often observes abrupt adoption rather than gradual progression, sometimes interpreted through complex systems perspectives in which interventions alter relationships within a system rather than producing linear effects (Hawe et al., 2009). Additive models struggle to account for situations where substantial motivational effort produces limited change until contextual conditions shift. The threshold formulation in the Eben model offers a possible explanation: behaviour emerges once combined conditions exceed a sufficiency boundary rather than increasing proportionally. This interpretation is consistent with evidence that structural and social determinants substantially shape health behaviours and service uptake (Lund et al., 2018). The model therefore provides a conceptual mechanism for non-linear behavioural emergence, suggesting that sudden adoption may reflect the crossing of an enabling condition threshold rather than unpredictable individual behaviour.

Implications for Intervention Design

A critical implication is that behavioural interventions should prioritise diagnosis over intensity. Much behavioural practice assumes that increasing intervention effort proportionally increases effectiveness. However, evidence from implementation research indicates that interventions are less effective when they are poorly matched to the behavioural context in which they are delivered (Keyworth et al., 2020). The model predicts diminishing returns when effort is applied to non-limiting conditions because the multiplicative structure constrains outcome improvement. This shifts intervention design from persuasive strategy to diagnostic reasoning: the practical task becomes identifying which variable currently limits behaviour rather than determining how strongly to intervene. In this sense, the model functions analogously to fault isolation in engineering systems, where correcting the primary constraint restores function more efficiently than general reinforcement.

Relationship to Existing Theories

The Eben model does not replace existing behavioural theories but reorganises their application. Stage-based readiness theories help indicate when behaviour may become psychologically possible (Prochaska & DiClemente, 1983). Determinant models help identify mechanisms influencing action (Michie et al., 2011). Ecological frameworks help locate the level at which intervention may operate (McLeroy et al., 1988). The contribution of the present model lies in specifying the dependency between these functions: rather than independent explanatory domains, they operate as sequential decision conditions.

This integration offers a potential explanation for an apparent contradiction in behavioural science; whereby different theories appear more predictive in different contexts. Each may describe a condition that becomes influential under alignment states. The model therefore proposes a conditional architecture in which seemingly competing findings reflect variation in dominant behavioural constraints rather than theoretical incompatibility.

Limitations and Future Evaluation

The present paper introduces a formal behavioural architecture and therefore represents an initial theoretical stage rather than a completed empirical programme. While the model generates clear, falsifiable predictions, its practical validity depends on systematic testing across applied settings. Future studies should examine whether behavioural outcomes demonstrate the predicted weakest-link and threshold patterns under both controlled and real-world conditions.

The variables of readiness, constraint clearance, and contextual support are intentionally abstract to enable cross-sector applicability. Although this generality enhances transferability, it requires operational definitions tailored to specific domains. The development of standardised measurement approaches across sectors (e.g., healthcare, organisational practice, and public policy) would improve comparability and strengthen precision in application.

The model also simplifies behavioural complexity into three core conditions. This reduction is deliberate, providing a decision architecture usable in practice rather than a comprehensive psychological taxonomy. Further research may extend the framework by refining measurement scales, modelling dynamic interactions, and evaluating predictive accuracy. The current work therefore establishes a structured foundation upon which empirical validation and methodological refinement can progressively build.

Conclusion

This paper presented the Eben Integrated Model as a formal decision architecture for behavioural implementation. By expressing behaviour as the alignment of readiness, constraint resolution, and contextual support, the model shifts attention from persuasive intensity to diagnostic precision. Rather than asking how strongly to influence behaviour, the framework specifies when behaviour becomes possible.

The principal benefit of this approach is practical clarity. Many existing theories successfully identify influences on behaviour but offer limited guidance on sequencing interventions. The Eben formulation converts behavioural explanation into operational logic, allowing practitioners to determine whether to prepare individuals, remove barriers, or modify environments. This reduces misdirected effort and explains why interventions often fail despite theoretical correctness.

Because the three conditions represent universal properties of human action, the framework is applicable across sectors. In healthcare, it can improve engagement and adherence by distinguishing motivational barriers from access limitations. In organisational change, it guides whether training, workflow redesign, or leadership support should be prioritised. In education, it clarifies the balance between learner readiness and institutional conditions. In public policy, it differentiates compliance problems caused by unwillingness from those caused by feasibility constraints. Across these domains, the model functions as a general diagnostic structure rather than a context-specific theory.

The contribution of the Eben Integrated Model is therefore architectural. It does not introduce new behavioural determinants but organises existing knowledge into a procedural system linking timing, mechanism, and environment. By formalising behavioural alignment mathematically, it provides a testable and transferable foundation for adaptive implementation. Future empirical studies can evaluate its predictive validity, but its immediate value lies in offering a coherent pathway from behavioural understanding to practical action across complex human systems.

Reference List (APA 7th Edition)

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Baum, F., & Fisher, M. (2014). Why behavioural health promotion endures despite its failure to reduce health inequities. *Sociology of Health & Illness, 36*(2), 213–225.

Hawe, P., Shiell, A., & Riley, T. (2009). Theorising interventions as events in systems. *American Journal of Community Psychology, 43*(3–4), 267–276.

Keyworth, C., Epton, T., Goldthorpe, J., Calam, R., & Armitage, C. J. (2020). Delivering opportunistic behaviour change interventions: A systematic review. *Health Psychology Review, 14*(2), 277–295.

Lund, C., Brooke-Sumner, C., Baingana, F., Baron, E. C., Breuer, E., Chandra, P., Haushofer, J., Herrman, H., Jordans, M., Kieling, C., Medina-Mora, M. E., Morgan, E., Omigbodun, O., Tol, W., Patel, V., & Saxena, S. (2018). Social determinants of mental disorders and the Sustainable Development Goals. *The Lancet Psychiatry, 5*(4), 357–369.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*(4), 351–377.

Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel: A guide to designing interventions*. Silverback Publishing.

Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science, 6*, 42. https://doi.org/10.1186/1748-5908-6-42

Miller, W. R., & Rollnick, S. (2013). *Motivational interviewing: Helping people change* (3rd ed.). Guilford Press.

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science, 10*, 53. https://doi.org/10.1186/s13012-015-0242-0

Norcross, J. C., Krebs, P. M., & Prochaska, J. O. (2011). Stages of change. *Journal of Clinical Psychology, 67*(2), 143–154.

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., Chisholm, D., Collins, P. Y., Cooper, J. L., Eaton, J., Herrman, H., Herzallah, M. M., Huang, Y., Jordans, M., Kleinman, A., Medina-Mora, M. E., Morgan, E., Niaz, U., Omigbodun, O., & Unützer, J. (2018). The Lancet Commission on global mental health and sustainable development. *The Lancet, 392*(10157), 1553–1598.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*(3), 390–395.

Sutton, S. (2001). Back to the drawing board? A review of applications of the transtheoretical model to substance use. *Addiction, 96*(1), 175–186.

West, R. (2005). Time for a change: Putting the transtheoretical model to rest? *Addiction, 100*(8), 1036–1039.

World Health Organization. (2022). *World mental health report: Transforming mental health for all*. WHO.