

# The development of ‘Make One Small Change’: an e-health intervention for the workplace developed using the Person-Based Approach

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## Abstract

**Background:** The application of digital health interventions is widespread and many employers are implementing employee e-health programs. Intended to enhance productivity by increasing wellbeing, workplace interventions often lack evidence of effectiveness and have low rates of retention. Use of the person-based approach (PBA) is one solution, which offers a systematic framework for developing effective digital health interventions. This paper describes the application of the PBA to the development of ‘Make one small change’ (Cigna MSC<sup>TM</sup>), an online behaviour change system for lifestyle habits focused on resilience, movement, eating and sleep.

**Method and results:** The development of Cigna MSC<sup>TM</sup> took place over four stages with colleagues ( $n = 79$ ) across Cigna globally. Application of the PBA entailed using high amounts of qualitative data to inform development and a cyclical process of ‘listening, applying and delivering’ was adhered to throughout. Early stages involved review of current literature and the collection of feedback in relation to existing interventions. Combined, results revealed key intervention development issues that were then used to form guiding principles. Guiding principles ensured intervention objectives translated into relevant design features. The final stages of evaluation included testing images, text and content approaches. Feedback dictated that the intervention should be fun, easy to use and include milestones for self-monitoring. The resulting version was finalised and made ready to pilot so future analysis can be made in relation to real-world engagement and the embedded evaluative content can be used to provide evidence of intervention effectiveness.

**Conclusions:** Using the PBA, which was evolved specifically to improve development of digital interventions, resulted in a workplace intervention embedded with in-depth user input combined with evidenced-based theory. This paper illustrates how using a rigorous methodology can drive the creation of an effective digital health intervention that uniquely allows for refinement at each stage.

## Keywords

Person-based approach, employee wellbeing, digital health intervention, qualitative research, behaviour change

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## Background

Over the last decade, employer spending on health and wellness programs has increased exponentially.<sup>1</sup> Attempting to improve employee health has progressed from being a simple gym membership supplement to a broad range of complex digital health interventions. Supported by a large body of evidence linking health risk status to productivity,<sup>2–5</sup> organisations globally have taken interest in how best to provide value in

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wellness programmes.<sup>6</sup> Employee health promotion is now a commonplace endeavour,<sup>7,8</sup> and large, well-known companies such as Google and Facebook take pride in their innovative and extensive wellbeing programs. A large driver of this employer trend is the research specifically associating increased employee wellbeing levels with higher levels of productivity and lower levels of absenteeism.<sup>9</sup> Health risk assessments (HRAs), which are often used to inform employee health programmes, have become standard practice within many organisations, and employee health risks can now be used as a measure to predict the financial health of a company.<sup>10,11</sup>

While employee health programs gained popularity on a global scale, advancements in digital technology also experienced significant growth. The use of telemedicine, online HRAs and digital self-monitoring devices have all supported the popularity of e-health interventions, all of which have the advantage of being cost-effective and scalable.<sup>12</sup> Amidst this e-health boom, both industry and academia have stopped to question the true effectiveness of these interventions and a lack of evaluation has been identified. Subsequently, assessment has become a focus within research. Resulting evidence suggests digital interventions implemented within the workplace have benefits for a variety of health risks and can be effective whether designed for specific illness conditions or general lifestyle behaviours. In fact, some reviews have found that simple online health programs can be beneficial even though the gold standard appears to be a multi-component intervention that combines human and digital support.<sup>13</sup>

However, other research has produced conflicting results when evaluating effectiveness of digital worksite health programs. This may be due to the difficulty of assessing e-health programs with adequate rigor, due to program complexity, or it may be due to the considerable lack of engagement that is commonly found within digital health research. This issue is often noted as a barrier with digital health programs, and it would appear that the effectiveness of e-health interventions overall is highly dependent on capturing and sustaining participant engagement.<sup>14</sup> It is a considerable challenge to design an intervention that successfully influences positive health outcomes when it has to be both individually tailored as well as administered across a large workplace setting. This challenge is intensified by high attrition and low retention rates, which are well-known issues within e-health intervention research.<sup>15</sup>

One solution that may support effective digital intervention design is the ‘person-based approach’ (PBA).<sup>16</sup> This approach was developed with digital solutions in mind but is applicable to any type of intervention. The main strength of the PBA is its systematic integration

of user feedback, which is emphasised throughout each stage of development. More specifically, user knowledge and insight is gained through consistent qualitative data collection and then applied to the process. Use of the PBA is still relatively new but it is the amalgamation of over 1000 in-depth interviews by a research team from the University of Southampton. Led by Professor Yardley, this team collaborated to design, implement and evaluate a large number of health-related interventions that addressed health issues ranging from physical activity promotion to management of serious conditions such as diabetes and cancer.<sup>17–23</sup>

The main elements key to the PBA are the iterative process of collecting and applying user feedback (especially that which is qualitative in nature) and the application of ‘guiding principles’. Guiding principles describe what the intervention objectives are, and then identify the key design-related features that will translate into these objectives being met. While they take time to create they are formed at the earliest stage possible and then used as a touchstone throughout the entire process. Guiding principles both lead and inform the intervention development. In simple terms, this is an approach that not only employs the application of participant input but is driven by the continuous flow of updated feedback.

Overall, the PBA process aims to combine information directly from participants with particular attention to psychosocial context. What participants see as valuable, how they respond at different stages and whether this translates into the desired behaviour change, is consistently reviewed for intervention refinement. This process allows for improved understanding of how different intervention elements impact individual users. If PBA processes are adhered to consistently, it is more likely to produce an engaging and acceptable intervention that can feasibly be implemented within the target population.

Make One Small Change (Cigna MSC<sup>TM</sup>) is an intervention that has been designed using this approach as it was originally introduced, and it is important to acknowledge that the approach has continued to develop since then.<sup>24</sup> Cigna MSC<sup>TM</sup> is aimed specifically at engaging global employees in their workplace and influencing certain health behaviour changes one habit at a time. The program, designed to be translated into multiple languages, addresses numerous domains of lifestyle habit formation (initially focused on resilience, movement, eating and sleep). This paper presents the development process of a digital wellbeing intervention created within a commercial context, which uses the PBA in a novel and efficient way to increase acceptability and engagement.

## Methods and results

The consolidated criteria for reporting qualitative studies (COREQ); 32-item checklist was used to guide the reporting of this study and is attached in Additional file 1.<sup>25</sup>

### Design overview

The PBA applied to the development of the current intervention took place across four key stages: planning, design, development and evaluation. Overlying this process was the interpretation of the key procedures integral to the PBA, of (i) listening, (ii) applying and (iii) delivering as conceptualised by the research team working within a commercial environment. This meant that the overall process (which took place between 2015 and 2017) was not linear but cyclical and overlapping at times. To collect the data integral to the PBA, semi-structured interviews with open questions,

focus groups in the form of workshops and ‘think-aloud’ interviews were used to gain insight. Cigna colleagues providing feedback used for co-design were designated as representing the target user population. Figure 1 illustrates this process. The description of this process is unique due to the industry setting context. What normally would be reported as a series of individual studies with specific aims, methods and results, was instead conceptualized as rounds of data collection and analysis, with the results of each ‘study’ or round feeding into and forming the next.

### Participants

Overall, 39 Cigna colleagues from global offices contributed feedback for qualitative data collection. Employees from a variety of departments were sent an email invitation to contribute to a project involving the development of a new intervention during work



**Figure 1.** Flowchart of intervention stages and process.

hours. No incentives were provided and the research was not subject to ethical review as the participants were voluntary co-designers identified later only by an ID number assigned to any individual feedback gathered. The majority of the colleagues were female (65%) and the age range was from 25 to 55 years. The first group of colleagues ( $n=13$ ) was selected from different departments such as sales, business intelligence and account management. These colleagues were recruited not only for their end-user experience of health interventions in the own workplace but also for their real-world experience in the procurement and implementation of workplace interventions. They were considered subject matter experts, and input was used to inform the planning and design stage. Following this, a further 18 colleagues contributed feedback from the perspective of end-users. These colleagues were of mix of those who had previous experience of workplace health interventions and some who had not. Lastly, 10 colleagues were invited to contribute feedback from both US and UK offices for final intervention evaluation.

### Localisation exercise

To support eventual translation of the intervention into 29 languages, a localisation exercise was conducted with a small group of eight colleagues contributed feedback from offices based in the United States, Spain, China and India on translation into various languages. Translation test samples of 350 words were made available for review to ensure that style and one of the translation was appropriate for each region.

### Interview methodology

Topic guides were used to conduct the semi-structured interviews, think-aloud interviews and focus groups (see Additional file 2) but only the semi-instructed interviews were recorded with digital voice recorders, transcribed and analysed with elementary thematic analysis. One researcher (TD) who was a Senior Product Manager (MSc Public Health) managed all the interviews, but the think-aloud interviews and focus groups included an additional colleague who assisted through observation and reporting of feedback with hand written notes. The overall process, which involved colleagues contributing feedback for co-design, could be considered participatory co-design. However, the research team analysed data independent from their co-design colleagues at each consultation stage so the methodology is also qualitative in nature.

### Stage 1 and 2: Intervention planning and design

During the first two stages, the cyclical PBA process of listening, applying and delivering was implemented through the use of semi-structured interviews and a focus group. The first round involved six in-depth interviews which lasted an average of 60–90 min. This data was then analysed and used to inform the nature of the interview guides for the subsequent focus group. Formatted as a half-day workshop ( $n=13$ ), the focus group involved a broad range of user representatives (i.e. colleagues who had not only participated in but also experienced procurement or implementation of previous employee health interventions). Workshop guides were concentrated on collecting information in relation to strengths and weaknesses of interventions previously experienced. During the workshop, case studies that colleagues themselves provided were used along with brainstorming exercises to generate discussion.

### Stage 1 and 2: results

The main feedback revealed during this first round of data collection was that previous interventions were problematic in that they had low recruitment and retention rates as well as a lack of evaluation. Without evaluative content, it was reported to be particularly difficult to discern what intervention components had been beneficial or effective. In relation to weak recruitment and retention rates, this was attributed to interventions being presented in an uninteresting manner followed by an excessive level of reading, both of which made programs difficult for users to understand. These issues were noted as substantial barriers to engagement. Additionally, strict timelines on participation (e.g. expiry of program access after 4 weeks of non-participation) meant that users were much less likely to engage as motivation waned.

Overall feedback proposed that future interventions should be easy to access at any time, and come across as a fun activity from the very start. Specifically, ‘bite sized’ chunks of information instead of lengthy reading or time commitments were recommended. It was also suggested that presentation could be improved by keeping the look and feel of interventions simple with ‘less text more images’. Finally, the addition of a feature where milestones and successes could be acknowledged was recommended. It was thought that these design features might be motivating, emotionally engaging and ‘less boring’, therefore increasing recruitment and sustaining participation.

The research team incorporated this feedback into the intervention design by focusing on fun and the option of ‘choosing your own pathway’ instead of the

recommendation of generic behaviour changes. In addition, there was a shift in approach to ‘marketing for health’ (i.e. approach to health promotion that engages marketing principles) instead of a classic health education style and an attempt to build some form of measurement of behaviour changes. In order to support acceptability throughout the user journey, language style, images and behaviour change techniques, in-line with the basic human values theory,<sup>26</sup> were integrated into the content. With the aim of creating intervention solutions that would translate participant feedback into actions, a visual map of the data was created by the research team using mind mapping software, a sample of which is shown in Figure 2 below.

Analyses of this collective data by the research team lead to initial drafts of the current intervention and simultaneously the development of guiding principles.

### Development of guiding principles

The creation of guiding principles can often be based on a combination of resources. As the main aim was to develop a digital wellbeing intervention for employees both engaging and acceptable, a rapid scoping narrative review of current digital health literature was first conducted. This review included studies that were randomized controlled trials (RCTs), reported in English, investigating digital health interventions (i.e. delivered online using a computer, tablet or smartphone) in the workplace. Electronic databases including MEDLINE, EMBASE, PubMed, PsycINFO and CINAHL were searched using a strategy loosely based on a PICO (population, intervention, comparison and outcome) strategy,<sup>27</sup> with terms based on MeSH indexing, and just under 15 articles were reviewed in full. Based on the initial rapid scoping results, a systematic review was eventually conducted and published to more robustly cover the topic.<sup>13</sup> The rapid scoping review findings were then combined with the initial colleague feedback in an effort to establish the key issues to be addressed for this particular intervention.

Evidence from recent literature suggested that challenges with digital health interventions were centered upon engagement (i.e. both recruitment and retention) and evaluation issues.<sup>22–25</sup> It appeared that being able to gain participant attention and sustain it in a way that enables detection of actual behaviour change, is a barrier with many digital interventions. These findings were subsequently supported by results from the first round of qualitative data which we described previously. Consolidation of these results formed the key issues that the intervention needed to address and the basis of the guiding principles. Concerns in relation to lack of recruitment, retention and evaluative content

led to subsequent design objectives and directly related key intervention features as described in Table 1.

### Stage 3: Development

During this stage, a paper draft was created representing the first 6 days of the intervention. To test acceptability of the intervention in its most basic form, eight new colleagues were recruited to think-aloud interviews that were structured based on insights from the previous focus group. They were questioned about what they were first drawn to on screens as well as what they first read or acted on. Near the end of the interviews, the final questions included asking individuals in the group to name one thing they liked, one thing they disliked and one thing they would change. To summarise, colleagues were then asked to name three words that they would use to describe their experience of the intervention thus far. The response to this query included feedback in the form of words like ‘simple’, ‘friends’ and ‘fun’. When checking this against the guiding principles, it was clear that the intervention was on track.

After each round of feedback the research team refined the intervention and provided a newer version with implemented changes for the participants to comment on. A total of 16 colleagues were rotated into eight rounds of interviews with 8 colleagues per round. It was during this time period the paper version graduated to an online interface design. In total, three redesigns of the ‘look and feel’ of the intervention were conducted based on what the colleagues found agreeable or off putting each time they viewed a new version. Testing screens, images, text size and approaches to content writing for motivation and encouragement were refined throughout. During the penultimate round, a ‘clickable’ online demo was made available for the first time.

### Stage 3: results

Key changes at this point included phasing out coaching characters, simplifying the design and showing all options at once on the same page, rather than having an exploratory approach. Examples of how this looked as it evolved and was implemented into the design can be seen in Figure 3. Samples of qualitative feedback from the eight rounds of interviews included:

*1C\*: Loved the progress bar, hated the coach.*

*2C: Making your own choices, liked the idea behind it.*

*3C: Liked the reminders, even more would be good.*

*4C: Easy, simple and short. It gets to the problem and offering a solution really quickly.*

*5C: It's very straight forward, it's easy to read. I think it's good, easy, attainable.*

*6C: Liked the option for blockers, the more the better.*

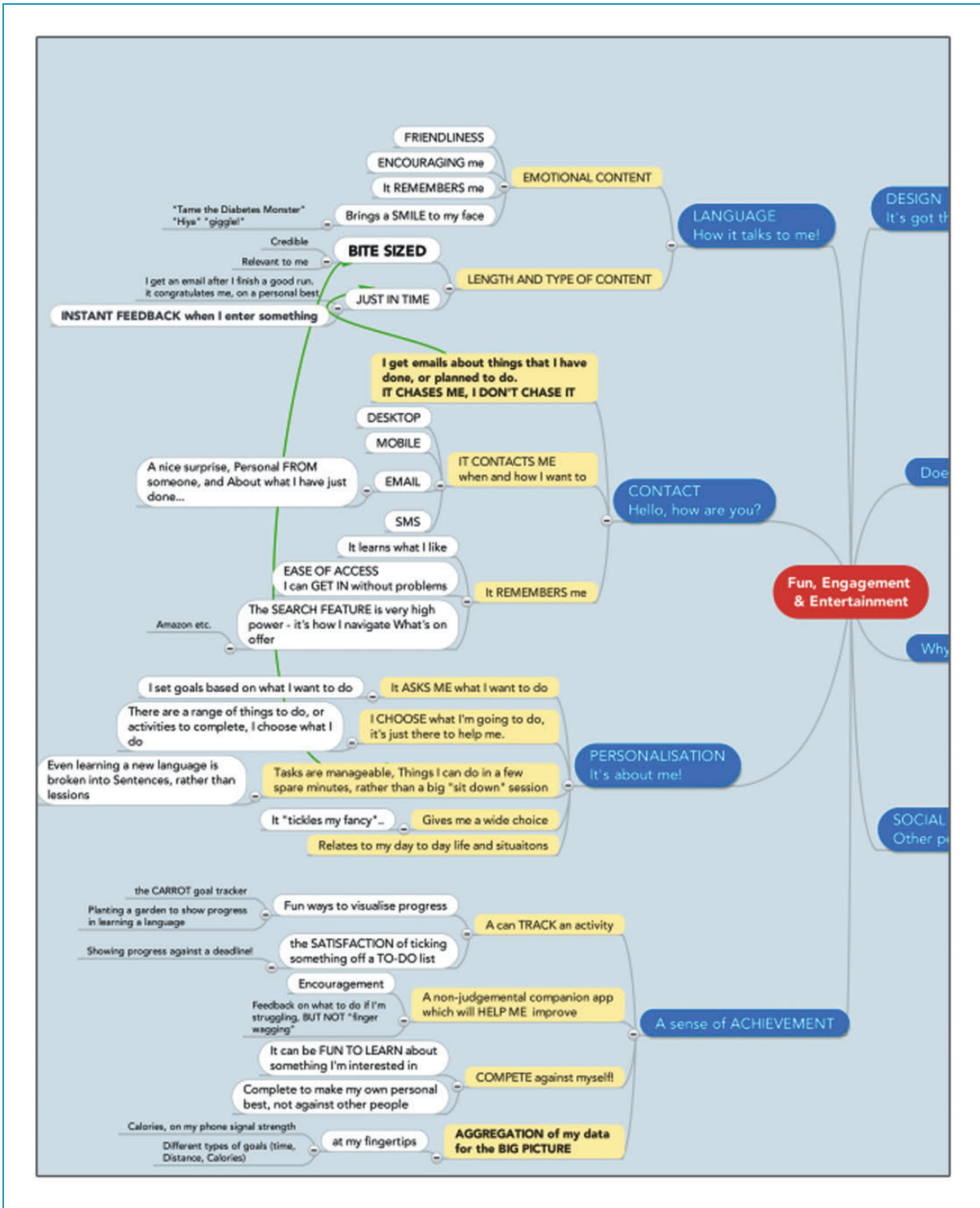


Figure 2 Visual mapping of qualitative feedback.

7C: Quick feedback is good... like the option of asking a friend for help.  
 8C: I didn't like the reminders but it was easy to opt out.  
 \*Grouping was according to stage. Group C was colleagues who contributed feedback in Stage 3.

**Stage 4: Evaluation**

During the final stage, the fully digital version of the intervention was tested for evaluation purposes. A new group of 10 colleagues were invited to contribute

**Table 1.** Guiding principles for the development of Make One Small Change.

Key issue	Design objectives	Key intervention features related to design objective
Prior interventions had a very low recruitment rate.	1. To make participation in a behaviour change intervention fun and easy to engage with.	<ul style="list-style-type: none"> <li>• <b>Design</b> was developed to be more “app” like and incorporated user processing types (i.e. high context: detail focused vs low context: look for instant recognition, easily confused)</li> <li>• <b>Language</b> was made informal and personal</li> <li>• Program features could be <b>personalised</b> (e.g. features could be turned on or off)</li> <li>• Program designed to only initiate <b>contact</b> with users via push notifications so “free from effort”</li> </ul>
Prior interventions had a very high attrition rate.	2. To sustain participation with a behaviour change intervention by making health information emotionally engaging and easy to use.	<ul style="list-style-type: none"> <li>• Sense of <b>achievement</b> encouraged through marking milestones throughout behaviour change process</li> <li>• Supports participant engaging with their own <b>social</b> network</li> <li>• Creating relevance through “marketing for health” where health promotion engages marketing principles instead of simply informing (i.e. health education)</li> <li>• Use of basic human values theory (i.e. openness to change, self-transcendence, conservation, self enhancement) to motivate behaviours so as to create coaching content which was engaging enough to encourage retention.</li> </ul>
Evaluation was not built into previous intervention so it was not possible assess effectiveness.	3. To build in evaluative content as a part of the intervention so effectiveness can be assessed when intervention is later piloted.	<ul style="list-style-type: none"> <li>• Use of a weekly SMART (specific, measurable, attainable, relevant and timely) behaviour change</li> <li>• Daily compliance monitoring (of SMART goal)</li> <li>• Weekly monitoring of larger outcomes (resilience or stress levels) included</li> <li>• Use of behaviour change models (i.e. Trans-theoretical model,<sup>28,29</sup> Social Cognitive theory,<sup>30,31</sup> and Self-efficacy theory,<sup>32</sup> Theory of Reasoned Action,<sup>33</sup> to inspire main design features of small steps, targeted level of readiness to take action and support of self-efficacy, all which have corresponding standardised questionnaires for use of assessment.</li> </ul>

feedback from both US and UK offices. Think-aloud interviews were again conducted and feedback from these interviews inspired the researchers to enhance the intervention so that the user had the option to choose from a ‘curated list’ of SMART (specific, measurable, attainable, relevant and timely) actions. As well, weekly support that was informed by behaviour change strategies specific to user preferences (e.g. self-management strategies, either peer-supported or autonomous self-monitoring) were built in. The weekly nature of the program, designed to align with regular employee working hours (i.e. Monday to Friday), subsequently allowed for evaluation of short-term intervention effectiveness on a week by week basis.

### Stage 4: results

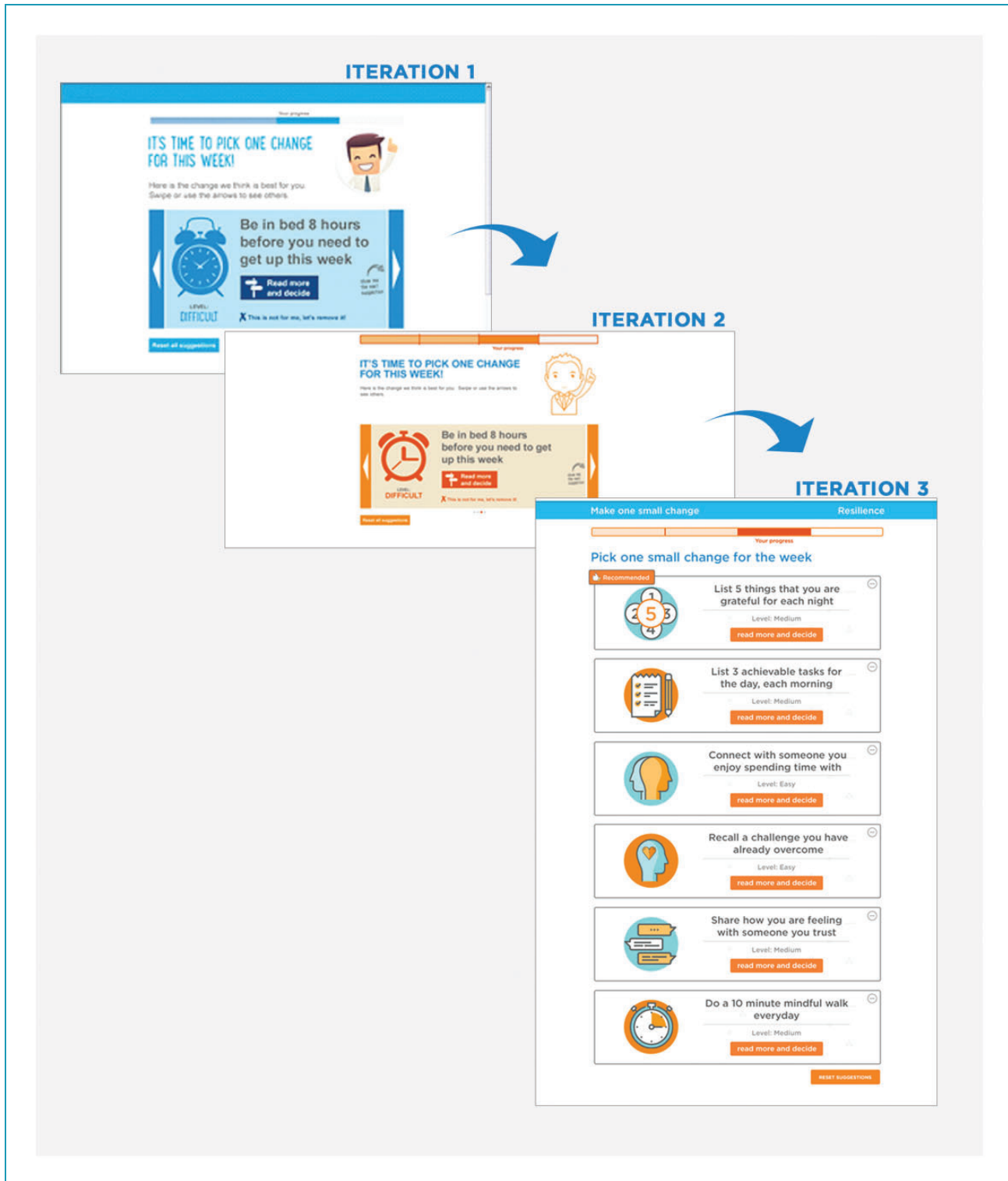
This round of data collection also confirmed existing acceptability issues, some of which were unavoidable in various contexts. As an example, there was initially a one-page presentation of the weekly flow of the program, which was confusing for some. The lack of clarity was such that some users failed to understand that they

needed to log back online at the end of the week for confirmation of results as well as selection of a new behaviour change options. Eventually, a video tour was recommended to facilitate understanding of this process. Some localisation issues surfaced with the US colleagues but this was mainly word selection, which would be dealt with at later stages by localisation of the content for each country.

### Stage 4: results

The final refinements included the tailoring of colours and illustrations to different countries based on preferences to do with local foods and stressor related images. Figure 4 shows one example of a final version and key features included.

Overall, final evaluation of the content found that the intervention was viewed positively. Colleagues offering feedback from the user perspective, reported that a major challenge was the ability to comprehend areas with minimal text description. A solution that emerged was that video demonstrations would be helpful in understanding some aspects of the program. To support the translation aspect of the intervention, a localisation

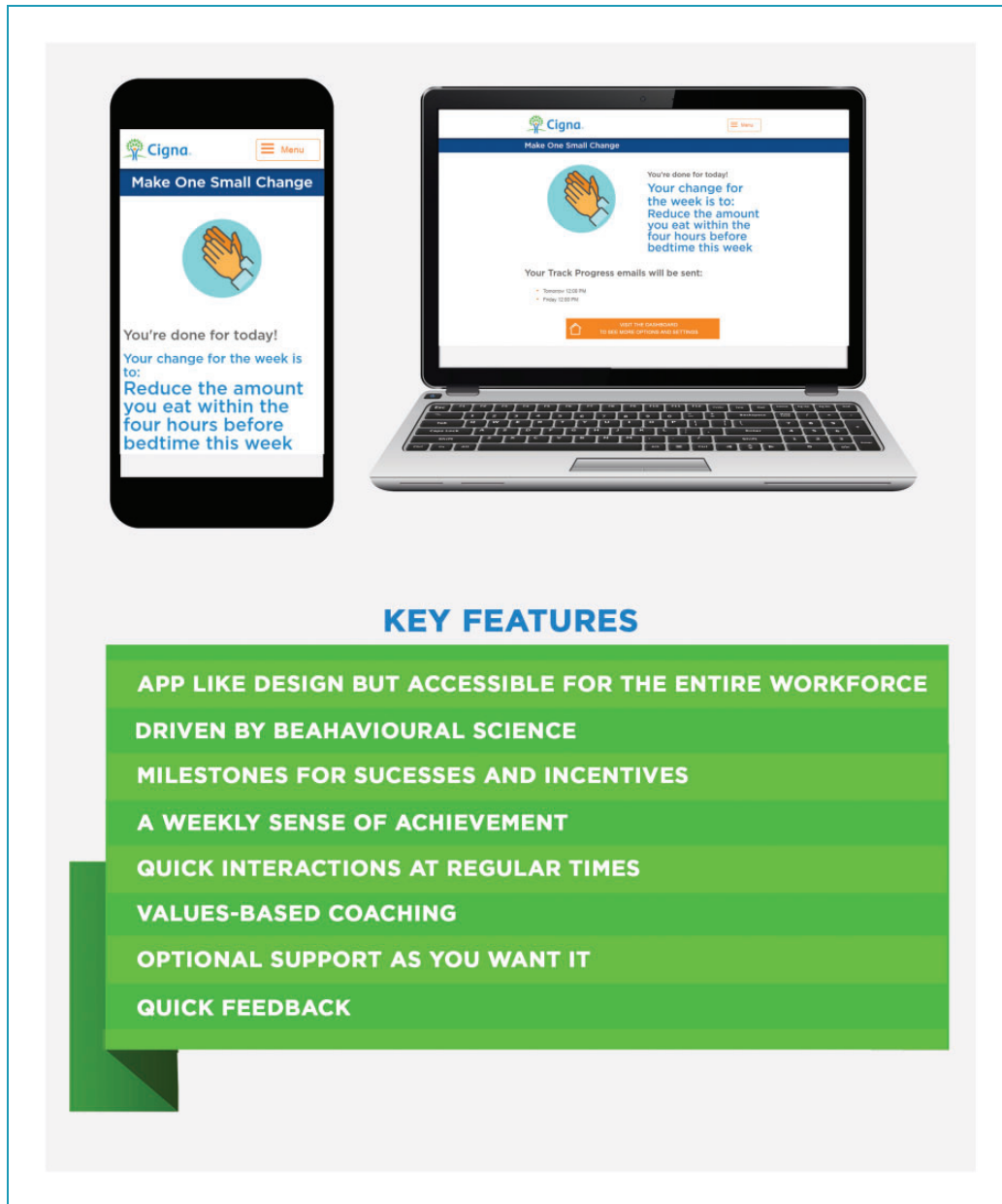


**Figure 3** Intervention iterations.

exercise was then conducted with small individual groups of colleagues (i.e. ranging from two to five participants) from the United States, Spain, China and India. Asked to review and provide feedback on how accurate the

translation was, colleagues noted that overall, the content was relevant and helpful. However, some cultures such as India, Spain and China, which had more hierarchical workplace structures, would not allow for open





**Figure 4** Final version sample.

conversations between management and colleagues in relation to health. Codes of conduct for being professional seemed to imply that this would be culturally inappropriate and changes were made to offer more acceptable suggestions for support. Based on this, minor refinements to values based coaching (i.e. to reflect culture-specific values), images and text, were conducted for effective translations.

Finally, as one of the original guiding principles of the intervention was to build in an evaluative component, the Brief Resilience Scale (BRI) was incorporated into the intervention so that it would be possible to assess resilience level changes on a weekly basis.<sup>34</sup>

The BRI is a six-item questionnaire with numeric rating scales from 1 to 5 and results ranging from a total possible score of 1–6 (with average scores 1.00–2.99 = low resilience, 3.00–4.30 = normal resilience, 4.31–6.00 = high resilience).

## Discussion

This paper presents the process of developing a digital wellbeing intervention for global employees using the PBA with the aim of improving acceptability and engagement. To fully embrace this approach, qualitative research was heavily relied upon throughout the process

so as to embed the user's psychosocial context firmly at the center of intervention development. Time was taken to engage Cigna colleagues who could most accurately provide real world observations from the perspective of those who represented the target population. Based on colleague feedback for co-design and current literature, the key issues identified early on were the need for increased and sustained engagement along with evaluative content. These issues were then translated into the creation of the guiding principles – a key element of the PBA. Utilized throughout, the guiding principles were particularly beneficial when attempting to gauge and monitor intervention development in respect to the original objectives. Too often interventions can lose relevancy during development based on logistics or resource availability, but with the application of the PBA to the development of Cigna MSC™ it was clear that the resulting product met the original objectives.

The advantage of using the PBA was evident throughout as the cyclical process of 'listen, apply and deliver', was implemented at each stage allowing for user preferences to lead the development of the intervention look, feel and style. In fact, due to the iterative nature of the PBA, the final product required few adaptations, some of which had already been predicted (but not yet amended due to time constraints). All too often, well-intentioned developers and researchers can make assumptions about what their target population might want, sometimes being influenced by what is currently the most popular product on the market. Through use of the PBA, current market trends were naturally included for testing during development without superseding the actual preferences of the users being targeted.

Finally, use of the PBA during the development of Cigna MSC™ was advantageous as it offered a structure by which theory can be put into practice. Applying a scientific approach to the development of a product in a fast paced market can be time-consuming and requires researchers to persevere through numerous iterations. This has resulted in an abundance of apps and online programs available globally for consumption, with little evidence to guide who they are most beneficial for much less how effective they are. Notably, the PBA supports recent models of behaviour change such as the COM-B (capability, opportunity, motivation and behaviour) model that draw on a strong foundation of academic research.<sup>35</sup> Incorporating scientific knowledge about behaviour change by applying the PBA means that specific drivers (i.e. design preferences), context (e.g. easy to access within the workplace) and health status (i.e. tailored options based on HRA scores) of the target population are addressed systematically. Although a little repetitive at times, the PBA is one the few evidence-based frameworks available. Because it can be used along-side theory-based approaches, it offers the

opportunity to create effective solutions that are acceptable for end users as evidenced by the feedback and preliminary results of the intervention described in this paper.

## Conclusions

Overall, the PBA facilitated a highly user-centric intervention being developed in the form of the Cigna MSC™ employee program. Putting high value on user feedback so as to inform development is an important step forward in the world of digital health interventions. Since the final stage of trial and implementation, the Cigna MSC™ has currently gone live within two multi-national companies across 15 countries and is being demoed with two more multi-national companies who will eventually implement it over an additional five countries to begin with. The Cigna MSC™ was initially designed to be translated into 29 different languages and the current tally is 13. In addition, the inclusion of a standardised measure (i.e. the BRI) will make it possible to evaluate the impact on behaviour change on a weekly basis. This built in evaluative content, along with the continued application of the PBA cyclical process of 'listen, apply, deliver', will ensure that intervention refinement will continue as long as users necessitate it.

**Contributorship:** JQ, PM, TD and AH conceived and designed the study. AH with the assistance of PM, TD and JQ, contributed to data collation, conducted the analyses, drafted and revised the manuscript. All authors read and approved the final manuscript.

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## References

1. Berry, L. L., Mirabito, A. M. & Baun, W. B. What's the hard return on employee wellness programs? *Harv. Bus. Rev.* 2010; 88: 104–12, 142.
2. Henke, R. M. et al. The relationship between health risks and health and productivity costs among employees at Pepsi Bottling Group. *J Occup Environ Med* 2010; 52: 519–27.
3. Shi, Y., Sears, L. E., Coberley, C. R. & Pope, J. E. The association between modifiable well-being risks and productivity. *J Occup Environ Med* 2013; 55: 353–364.
4. Rosekind, M. R. et al. The cost of poor sleep: workplace productivity loss and associated costs. *J Occup Environ Med* 2010; 52: 91–8.
5. Meraya, A. M. & Sambamoorthi, U. Chronic condition combinations and productivity loss among employed nonelderly adults (18 to 64 years). *J Occup Environ Med* 2016; 58: 974–978.
6. Goetzel, R. Z. et al. Do workplace health promotion (wellness) programs work? *J Occup Environ Med* 2014; 56: 927–934.
7. Kilpatrick, M. et al. Workplace health promotion. *J. Occup Environ Med* 2014; 56: 645–651.
8. Mitchell, R. J., Ozminkowski, R. J. & Hartley, S. K. The association between health program participation and employee retention. *J Occup Environ Med* 2016; 58: 896–901.
9. Anderson, D. R. et al. The relationship between modifiable health risks and group-level health care expenditures Health Enhancement Research Organization (HERO) Research Committee. *Am J Health Promot* 2000; 15: 45–52.
10. Baxter, S., Sanderson, K., Venn, A. J., Blizzard, C. L. & Palmer, A. J. The relationship between return on investment and quality of study methodology in workplace health promotion programs. *Am J Heal Promot* 2014; 28: 347–363.
11. Pelletier, K. R. A review and analysis of the clinical and cost-effectiveness studies of comprehensive health promotion and disease management programs at the worksite: Update VII 2004–2008. *J Occup Environ Med* 2009; 51: 822–837.
12. Ross, J., Stevenson, F., Lau, R. & Murray, E. Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). *Implement Sci* 2016; 11: 146.
13. Howarth, A., Quesada, J., Silva, S., Judycki, S. & Mills, P. The impact of digital health interventions on health-related outcomes in the workplace: A systematic review *DIGITAL HEALTH*, 2018. doi:doi.org/10.1177/2055207618770861
14. O'Connor, S. et al. Understanding factors affecting patient and public engagement and recruitment to digital health interventions: a systematic review of qualitative studies. *BMC Med Inform Decis Mak* 2016; 16: 120.
15. Kohl, L. F. M., Crutzen, R. & de Vries, N. K. Online prevention aimed at lifestyle behaviors: a systematic review of reviews. *J Med Internet Res* 2013; 15: e146.
16. Yardley, L., Morrison, L., Bradbury, K. & Muller, I. The person-based approach to intervention development: application to digital health-related behavior change interventions. *J Med Internet Res* 2015; 17: e30.
17. Yardley, L., Morrison, L. G., Andreou, P., Joseph, J. & Little, P. Understanding reactions to an internet-delivered health-care intervention: accommodating user preferences for information provision. *BMC Med Inform Decis Mak* 2010; 10: 52.
18. Ware, L. J. et al. Exploring weight loss services in primary care and staff views on using a web-based programme. *Inform Prim Care* 2012; 20: 283–8.
19. Yardley, L. et al. Integrating user perspectives into the development of a web-based weight management intervention. *Clin Obes* 2012; 2: 132–141.
20. Anthierens, S. et al. General practitioners' views on the acceptability and applicability of a web-based intervention to reduce antibiotic prescribing for acute cough in multiple European countries: a qualitative study prior to a randomised trial. *BMC Fam Pract* 2012; 13: 101.
21. Yardley, L., Miller, S., Teasdale, E., Little, P. & Primit Team. Using mixed methods to design a web-based behavioural intervention to reduce transmission of colds and flu. *J Health Psychol* 2011; 16: 353–364.
22. McDermott, L. et al. Developing a computer delivered, theory based intervention for guideline implementation in general practice. *BMC Fam Pract* 2010; 11: 90.
23. Dennison, L., Morrison, L., Conway, G. & Yardley, L. Opportunities and challenges for smartphone applications in supporting health behavior change: qualitative study. *J Med Internet Res* 2013; 15: e86.
24. Morrison, L., Muller, I., Yardley, L. & Bradbury, K. The person-based approach to planning, optimising, evaluating and implementing behavioural health interventions. *Eur Health Psychol* 2018; 20: 464–469.
25. Tong, A. et al. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007; 19: 349–57.
26. Schwartz, S. Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. *Adv Exp Psychol* 1992; 1–65.
27. Counsell, C. Formulating questions and locating primary studies for inclusion in systematic reviews. *Ann Intern Med* 1997; 127: 380–7.
28. Prochaska, J. O. & DiClemente, C. C. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol* 1983; 51: 390–5.
29. Prochaska, J. O., DiClemente, C. C. & Norcross, J. C. In search of how people change Applications to addictive behaviors. *Am Psychol* 1992; 47: 1102–14.
30. Bandura, A. *Social foundations of thought and action: a social cognitive theory* Prentice Hall, 1986.
31. Bandura, A. Self-efficacy mechanism in human agency. *Am Psychol* 1982; 122: 122–147.
32. Bandura, A. Self-efficacy: Toward a unifying theory of behavioural change. *Psychol Rev* 1977; 84: 191–215.
33. Fishbein, M. & Ajzen, I. *Belief, attitude, intention, and behavior: an introduction to theory and research*. Addison-Wesley Pub Co, 1975.
34. Pagoto, S. & Bennett, G. G. How behavioral science can advance digital health. *Transl Behav Med* 2013; 3: 271–6.
35. Michie, S., West, R., Campbell, R., Brown, J. & Gainforth, H. *ABC of behaviour change theories*. Silverback Publishing, 2014.