

Using tailored eHealth programmes to stimulate primary health care professionals? lifestyle counselling guideline adherence-Lessons learned from the STAR project

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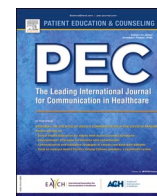
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Using tailored eHealth programmes to stimulate primary health care professionals' lifestyle counselling guideline adherence - Lessons learned from the STAR project

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ABSTRACT

Background: Although individually tailored eHealth programmes have shown to be effective in changing patient and citizen health behaviours, they have so far not been applied to lifestyle counselling guideline adherence in primary health care professionals beyond our STAR project. The programme aimed to support general practice nurses adhering to national smoking cessation counselling guidelines and showed encouraging positive impacts on both nurse and patient level.

Objective: To identify lessons learned from our successful application of a tailored eHealth programme in primary health care.

Methods: Triangulation of information from different sources collected throughout the project run time (e.g., project meetings, discussions with experts in the fields of computer tailoring, smoking cessation and professional education and interactions with general practice nurses).

Results: We identify four lessons learned which developers and testers of tailored eHealth programmes in primary health care should consider, relating to 1) Choosing outcome measures, 2) Measuring outcomes, 3) Practical feedback application & Programme accessibility, and 4) Programme interaction.

Practice implications: We share this information in the hope that we will see more applications of this promising intervention strategy – that can build on our work – in the future.

1. Introduction

When it comes to supporting an individual's healthy behaviour change (e.g., smoking cessation, improving dietary intake or physical activity), the incorporation of personalised, or tailored, feedback has been successfully applied in online programmes targeting citizens and patients alike [1,2]. Personalising feedback and tailoring content to an individual's beliefs and personal circumstances has shown to be more effective in changing psychological constructs and behaviour than generic information transfer [3]. Additionally, tailored feedback is often more intensely interacted with, and deemed more relevant by its target audience [4]. With the rise in popularity and subsequent use of eHealth and mHealth channels, tailored feedback can now reach large numbers of citizens or patients not necessarily grouped by geographical location or

available timeslots. Such programmes can therefore be accessed at the individual user's leisure, wherever they have online access, increasing availability [5] and their scalability potential.

In primary health care, the importance of supporting patients to make and sustain healthy lifestyle choices is also gaining traction, as primary care often serves as a gateway for more specialised (and therefore more invasive and expensive) care options. As such, primary healthcare professionals are stimulated to incorporate preventive services in their practice, ranging from screening for lifestyle risk factors to high intensity lifestyle counselling [6–8]. Regarding counselling, guidelines are provided to help professionals address health behaviour, motivate their patients to formulate healthy lifestyle goals and help them to reach these goals [9].

However, primary health care professionals report a lack of

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knowledge, confidence, and skills, as well as insufficient time and flexibility to make room for patient education and disease prevention in their daily practice [10–12]. To help them adhere to available guidelines despite these circumstances, online tailored programmes can offer health professionals feedback based on their personal circumstances, beliefs, and current behaviour, at a time when it suits them. Since tailored feedback has shown potential in changing health behaviour among citizens and patients and online access now makes it possible to use the programme when and where desired, primary health care professionals might be another group to benefit from online tailored advice that aims to help them change relevant professional behaviour, such as patient-provider communication skills and clinical guideline adherence. Therefore, tailored eHealth programmes appear to be both a practical and effective choice to improve lifestyle counselling guideline adherence in primary care health professionals.

Therefore, during 2014–2016, we developed and tested an online tailoring programme (STAR) meant for nurses working in general practice (i.e., practice nurses and nurse practitioners). The STAR programme aimed to improve general practice nurses' uptake of the Dutch smoking cessation counselling guidelines [13], as these health professionals are the ones most likely to be actively involved in smoking cessation counselling in this setting in the Netherlands [14]. As a result of exposure to the STAR programme, guideline adherence improved in those nurses with more extensive previous counselling experience and those reporting more unfavourable cognitions (e.g., lower levels of self-efficacy and social support) [15]. Furthermore, the programme was likely to be cost-effective in improving nurses' guidelines adherence and short-term quit rates among counselled patients [16]. Also, nurses appreciated the program's usefulness and accessibility, and smokers were very satisfied with the counselling received (7.9/10). These findings show tailored feedback's potential in digitally supporting primary health care professionals in lifestyle counselling guideline adherence.

However, a literature search (see [appendix A](#) for the search strategy applied) showed that no online tailored feedback programmes to support primary health care professional counselling skills have been developed and tested before or since the STAR programme. Furthermore, although a recently published Cochrane review exploring strategies to improve smoking cessation rates in primary care identified 7 trials testing health professional training programmes, none of these programmes included a tailored component meant to influence health professional behaviour [17]. Another review [18] summarizing the effect of 32 tailored programmes to address determinants of health professional practice similarly did not identify any individually tailored online programmes and only three programmes that addressed individually assessed facilitators & barriers to primary health care professional practice [19–21]. All three programmes were offline (i.e., consisting of printed educational materials or an individual meeting in which tailored information was conveyed) and presented mixed results. While access to Baker and colleagues' tailored programme to support depression guideline adherence among general practitioners increased the odds of the guideline recommendation to assess suicide risk in patients dealing with depression, no significant differences for other guideline recommendations were found [19]. Cheater et al. [20] described no improvements in urinary incontinence guideline adherence care among community nurses. And Simon et al.'s tailored programme, aimed to increase diuretic or beta-blocker use to treat hypertension [21], performed better compared to usual care, but not to a group-based programme. Moreover, economic analyses for the latter programme showed an average daily per person drug cost savings of 0.0558 dollars, compared to usual care [22]. However, the cost of providing this individually tailored programme per practice was considerable higher than usual care (2400 vs. 333 dollars, respectively). As online programme access can be scaled up without much additional cost, developing online tailored programmes seems a natural next step to cost-effectively improve guideline adherence in primary health care professionals.

As the STAR programme has shown promise, but so far has not seen

follow-up, we advocate for more programme development and research to fully unlock the potential of individually tailored online feedback targeted at primary health care professionals. Based on our experiences during development, and effect, process and cost-effectiveness evaluations within the STAR project, this paper aims to support any research and/or developer groups interested in using tailored online feedback aimed at improving lifestyle counselling guideline adherence by primary health care professionals. For this purpose, we will present challenges faced and lessons learned, to consider when developing and testing such tailored programmes.

1.1. The STAR project; A brief content overview

Our web-based computer-tailored programme was developed including three modules with individually tailored advice, an online forum, modules with information about smoking cessation, Frequently Asked Questions (FAQs) and a counselling checklist. We based tailoring of our programme content on constructs from the I-Change Model [23], a behaviour change framework that has shown to be relevant in explaining and changing health behaviours [24,25] and health professional practice [12,26,27]. Participating general practice nurses had access to the programme for a period of 6 months. Tailored feedback on nurses' current behaviour, intention of adherence to the smoking counselling guideline, knowledge, attitude, self-efficacy, social influence perceptions, and action and coping planning was provided based on individual user input obtained using a digital questionnaire. The programme's effects were assessed by comparing an intervention group (having access to all modules) with a control group (having access to FAQs and counselling checklist modules only). The programme's effects on guideline adherence and quit (attempt) rates among counselled smokers were assessed after 6 and 12 months (patients in both study arms received smoking cessation counselling). Cost-effectiveness and cost-utility were also assessed at those time points [15,16]. Further detailed information on the STAR programme content is available in our protocol paper [13].

2. Challenges faced, lessons learned and recommendations that followed

Throughout the STAR project run time, we reviewed experiences considering the development and testing of STAR. Project group discussions and feedback of experts in the fields of computer tailoring, smoking cessation and professional education supported this process. Furthermore, we conducted exit interviews with general practice nurses participating in the STAR randomised controlled trial.

In this paper, we will discuss four topics we carefully considered in the development of our programme and the related challenges we faced along the way: 1) Choosing outcome measures, 2) Measuring outcomes, 3) Practical feedback application & Programme accessibility, and 4) Programme interaction.

2.1. Choosing outcome measures

In the STAR project, our primary outcome was continued smoking cessation among counselled smokers at 6 and 12 months after baseline (i.e., immediately after nurses' access to the programme ended and 6 months later). From a public health perspective, this makes a lot of sense; assessing whether a short-term proxy of health gains was observable in counselled individuals. However, the programme was not directly aimed at improving this outcome, but rather to stimulate general practice nurses' guideline adherence. Therefore, we measured this intermediate outcome as well. As we found out, only experienced nurses and those that reported more unfavourable cognitions at baseline significantly benefitted from the programme. On a patient level, a significant reduction was found in intervention group patients' nicotine dependence after six months, but this effect disappeared after twelve

months. Had we not measured both outcomes, we would not have known whether any effect on smoking cessation rates (or lack thereof) could be related to nurses' guideline adherence. We therefore recommend including both patient and health professional outcome measures to better understand guideline adherence programme effects.

2.2. Measuring outcomes

Although we understood what we wanted to measure in general practice nurses (i.e., their guideline adherence), identifying an accurate way in which to do it was more challenging. We applied data triangulation from three sources: self-reported nurses' guideline adherence for each consultation, reported guideline adherence by counselled patients and audio recordings of a random set of smoking cessation consultations. However, 3 main issues emerged: 1) data was regularly missing, 2) data from different sources showed discrepancies and 3) the quality of counselling could not be assessed.

Regarding missing data, we did not have guideline adherence assessments available for each consultation from nurse and patient, nor did we audio record all consultations to allow for coding guideline adherence by an independent coder. Furthermore, scores from all available sources indicated that we likely did not assess the complete smoking cessation counselling process. For instance, assessing smoking behaviour and offering a brief advice to quit were not consistently reported, even though we would expect these guideline steps to be applicable to any type of patient when talking about smoking cessation. We expect that counselling often took place over the course of several consultations or that initial steps were offered by a different health professional (e.g., general practitioners offering a brief quit advice before referral to the general practice nurse participating in our trial). We recommend following the patient's journey through their counselling process, regardless of which health professional is providing that bit of counselling and when. Options would be to include all health professionals in a practice, incorporate reminders in the practice administrative system or actively involve the patient in the data collection by serving as a prompt.

Regarding data discrepancies, in some instances nurse, patient and coder of the audio recording reported different levels of adherence from the same consultation. Triangulation of data was therefore not straightforward, as three truths needed to be combined. Based on this experience, we would recommend including a consistent objective measure of guideline adherence (e.g., an audiotaping and all consultations and applying a valid assessment tool using two coders). However, we also appreciate that perceived adherence levels can have their own impact on outcomes (e.g., on patient satisfaction or general practice nurse self-efficacy). We would therefore recommend continuing to investigate guideline adherence from both the primary care health professional and the counselled patient as unit of analyses and investigate how general practice nurse and patient evaluations relate to objective assessments.

Regarding counselling quality, our measures focused on what part of the guideline was applied, but not how this was done. Our recommendation would therefore be to apply a measurement tool that can accurately assess counselling quality within the context of guideline adherence, such as the Motivational Interviewing Treatment Integrity Code [28].

2.3. Practical feedback application & accessibility

For general practice nurses with more extensive counselling experience at the start of the trial, using the STAR programme improved their guideline adherence, while for nurses that had less practical experience at baseline it did not. Possibly, less experienced nurses' degree of integration of guideline use in daily work routine was lower, which is known to influence guideline implementation in primary care [29]. Consequently, they might have found it more difficult to apply practical

feedback from the programme, even if they were motivated to apply the guideline to a wider extent. To support this subgroup of primary health care professionals, we recommend combining tailored feedback with training sessions on counselling guideline application. This could be offered at the worksite, integrated in the tailored programme [30], or a combination of the two. In these sessions, trainers could offer opportunities to practice specific skills using simulation practices [31], identify organisational barriers to guideline adherence and support the development of an individual implementation plan for each nurse. Counselling guideline adherence programmes can also be helpful as part of primary health care professional curricula, to prepare interns for counselling according to the guideline at an earlier stage in their career. Online tailored programmes that can motivate and enable students to incorporate these counselling skills into their communication arsenal and within the context of clinical practice will add benefit to already existing teaching modules on communication and counselling.

Furthermore, general practice nurses reported to view STAR programme materials and feedback before or after, but not during consultations. Although the programme was web-based, it was not integrated in practice administration systems. This made it either impossible (i.e., computers in consultation rooms did not have Internet access) or more complicated (i.e., nurses would have to toggle between systems) to access the programme while counselling smoking patients. We therefore recommend exploring opportunities to integrate guideline adherence programmes in general practice administrative systems, to provide handheld devices to review programme content during consultations (e.g., via a tablet) or to (also) offer paper-based versions of relevant programme features (e.g., list of guideline steps or example questions to introduce relevant topics) that can be used during consultations.

2.4. Programme interaction

In the STAR project, the programme provided tailored feedback and access to additional features. This was based on needs and preferences explored in interviews with general practice nurses [10], such as a need for an online forum for peer support and a practical overview of the counselling steps and instructions on how to apply them. However, most nurses used the tailored feedback feature only once and the majority did not (regularly) interact with other programme features. Research has shown that exposure to more than one tailored feedback moment is more effective in changing behaviour in patients or citizens [32] and general practice nurse clinical test performance [33], so it stands to reason this might also benefit their guideline adherence and should be stimulated.

STAR project exit interviews shed some light on the reasons general practice nurses did not return to the programme and interact with it more frequently. Most importantly, nurses suggested reducing the length of textual program content, as using the programme was perceived as time consuming. We therefore recommend applying strategies to limit user time investment while retaining high-quality feedback. Several strategies could be applied to facilitate this. Firstly, the number of theoretical constructs that were used to offer tailored feedback could be reduced; providing users with feedback on selected constructs based on a motivational profile assessment [34] or offering users the choice as to what they would like feedback on. However, the content of the STAR programme was already presented in a flexible format, meaning that nurses could (repeatedly) select a topic to read small pieces of content of their choice. Secondly, as our programme was mainly text-based, application of alternative communication strategies (e.g., videos, graphs, animation) could have improved effectiveness [35, 36] and reduced (perceived) time investment. By maintaining interactivity (e.g., by providing tailored advice in video format), improvements in learning outcomes and programme acceptability are more likely [37–39]. Thirdly, by applying computer-adaptive testing (CAT) methods, lengthy standardized questionnaires could be replaced by questionnaires that are individually tailored in terms of length and

content, while maintaining tailoring quality. Using CAT, each questionnaire item is dynamically selected from a pool of items based on a measurement model [40], resulting in a questionnaire that is optimized for a specific individual by only containing items relevant for this specific individual. This way, questionnaires could potentially be shortened in length to one-third of the initial number of items, reducing the completion burden among nurses. This idea of integrating CAT in computer-tailoring programmes has only recently been put forward [41] and we are unaware of any empirical work in this area so far.

General practice nurses not returning to the programme might also be related to the fact that content remained relatively consistent over time and no new content was introduced. Although nurses could request an updated tailored advice, the content of this update was based on the same questions nurses had answered previously to obtain their initial feedback and was composed of a selection of messages from the same feedback library. We recommend offering new, but brief, content to stimulate return visits by interested nurses. Of particular interest is the incorporation of iterative tailoring strategies, as they have shown to be more effective than statically tailored programmes in citizens [32]; offering feedback based on guideline-related changes the user has already made in terms of cognition (e.g., feeling more capable in supporting smokers to increase their motivation to quit) and behaviour (e.g., supporting smokers to increase their motivation to quit).

Lastly, interviewed general practice nurses reported a lack of accessibility of the programme during consultations; recounting using the programme before or after, but not during consultations with patients, a time where arguably the programme content could have the most impact. Therefore, in addition to integrating support programmes in general practice administrative systems to improve accessibility, we also recommend integrating a reminder system into the programme that is sensitive to context characteristics, such as geographical location (e.g., when entering their workplace) or behaviour (e.g., right before a lifestyle counselling consultation is scheduled); strategies that have shown feasible in smokers and patients [42,43].

3. Conclusion

Although tailored eHealth programmes have shown to be effective in changing patient and citizen health behaviours, they have so far not been applied to lifestyle counselling guideline adherence in primary care health professionals. In this paper, we share our experiences from the STAR project and make recommendations towards research and development, in the hope that we will see more applications of this promising intervention strategy in the future.

CRediT authorship contribution statement

Ciska Hoving: Conceptualisation, Writing – original draft, Writing – review & editing. **Dennis de Ruijter:** Conceptualisation, Writing – review & editing. **Eline Smit:** Conceptualisation, Writing – review & editing.

Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article to disclose.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.pec.2023.107621](https://doi.org/10.1016/j.pec.2023.107621).

References

- [1] Ryan K, Dockray S, Linehan C. A systematic review of tailored eHealth interventions for weight loss. *2055207619826685 Digit Health* 2019;5. <https://doi.org/10.1177/2055207619826685>.
- [2] Smit ES, de Vries H, Hoving C. Effectiveness of a Web-based multiple tailored smoking cessation program: a randomized controlled trial among Dutch adult smokers. *J Med Internet Res* 2012;14:e82. <https://doi.org/10.2196/jmir.1812>.
- [3] Lustria MLA, Noar SM, Cortese J, Van Stee SK, Glueckauf RL, Lee J. A meta-analysis of web-delivered tailored health behavior change interventions. *J Health Commun* 2013;18:1039–69. <https://doi.org/10.1080/10810730.2013.768727>.
- [4] Ruiter RAC, Kessels LTE, Jansma BM, Brug J. Increased attention for computer-tailored health communications: an event-related potential study. *Health Psychol* 2006;25:300–6. <https://doi.org/10.1037/0278-6133.25.3.300>.
- [5] Penchansky R, Thomas JW. The concept of access: definition and relationship to consumer satisfaction. *Med Care* 1981;19:127–40. <https://doi.org/10.1097/00005650-198102000-00001>.
- [6] Davidson KW, Barry MJ, Mangione CM, Cabana M, Caughey AB, Davis EN, et al. Screening for prediabetes and type 2 diabetes: US preventive services task force recommendation statement. *J Am Med Assoc* 2021;326:736–43. <https://doi.org/10.1001/jama.2021.12531>.
- [7] Rombouts M, Raaijmakers LGM, Kuunders TJM, Van Steijn-Martens R, de Vuijs T, van Donkersgoed H, et al. The acceptance and use of the e-health instrument “The Personal Health Check” in four Dutch Municipalities: lessons learned. *J Prim Prev* 2021. <https://doi.org/10.1007/s10935-021-00651-2>.
- [8] US Preventive Services Task Force. Interventions for tobacco smoking cessation in adults, including pregnant persons: US preventive services task force recommendation statement. *J Am Med Assoc* 2021;325:265–79. <https://doi.org/10.1001/jama.2020.25019>.
- [9] World Health Organization. Toolkit for delivering the 5A's and 5R's brief tobacco interventions in primary care. Geneva, Switzerland: World Health Organization; 2014.
- [10] De Ruijter D, Smit ES, de Vries H, Goossens L, Hoving C. Understanding Dutch practice nurses' adherence to evidence-based smoking cessation guidelines and their needs for web-based adherence support: results from semistructured interviews. *Br Med J Open* 2017;7:e014154. <https://doi.org/10.1136/bmjopen-2016-014154>.
- [11] Hébert ET, Caughey MO, Shuval K. Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review. *Br J Sports Med* 2012;46:625–31. <https://doi.org/10.1136/bjsports-2011-090734>.
- [12] Leitelin L, Smit ES, de Vries H, Hoving C. Factors influencing Dutch practice nurses' intention to adopt a new smoking cessation intervention. *J Adv Nurs* 2012;68:2185–94. <https://doi.org/10.1111/j.1365-2648.2011.05903.x>.
- [13] De Ruijter D, Smit ES, de Vries H, Hoving C. Web-based computer-tailoring for practice nurses aimed to improve smoking cessation guideline adherence: a study protocol for a randomized controlled effectiveness trial. *Conte Clin Trials* 2016;48:125–32. <https://doi.org/10.1016/j.cct.2016.04.007>.
- [14] Freund T, Everrett C, Griffiths P, Hudon C, Naccarella L, Laurant M. Skill mix, roles and remuneration in the primary care workforce: who are the healthcare professionals in the primary care teams across the world. *Int J Nurs Stud* 2015;52:727–43. <https://doi.org/10.1016/j.ijnurstu.2014.11.014>.
- [15] De Ruijter D, Candel M, Smit ES, de Vries H, Hoving C. The Effectiveness of a Computer-Tailored E-Learning Program for Practice Nurses to Improve Their Adherence to Smoking Cessation Counseling Guidelines: Randomized Controlled Trial. *J Med Internet Res* 2018;20:e193. <https://doi.org/10.2196/jmir.9276>.
- [16] De Ruijter D, Hoving C, Evers S, Hudaes R, de Vries H, Smit E. An economic evaluation of a computer-tailored e-learning program to promote smoking cessation counseling guideline adherence among practice nurses. *Patient Educ Couns* 2019;102:1802–11. <https://doi.org/10.1016/j.pec.2019.07.015>.
- [17] Lindson N, Pritchard G, Hong B, Fanshawe TR, Pipe A, Papadakis S. Strategies to improve smoking cessation rates in primary care. *Cochrane Database Syst Rev* 2021;9:CD011556. <https://doi.org/10.1002/14651858.CD011556.pub2>.
- [18] Baker R, Camosso-Steinovic J, Gillies C, Shaw EJ, Cheater F, Flottorp S, et al. Tailored interventions to address determinants of practice. *Cochrane Database Syst Rev* 2015;4:CD005470. <https://doi.org/10.1002/14651858.CD005470.pub3>.
- [19] Baker R, Reddish S, Robertson N, Hearnshaw H, Jones B. Randomised controlled trial of tailored strategies to implement guidelines for the management of patients with depression in general practice. *Br J Gen Pr* 2001;51:737–41.
- [20] Cheater FM, Baker R, Reddish S, Spiers N, Wailoo A, Gillies C, et al. Cluster randomized controlled trial of the effectiveness of audit and feedback and

- educational outreach on improving nursing practice and patient outcomes. *Med Care* 2006;44:542–51. <https://doi.org/10.1097/01.mlr.0000215919.89893.8a>.
- [21] Simon SR, Majumdar SR, Prosser LA, Salem-Schatz S, Warner C, Kleinman K, et al. Group versus individual academic detailing to improve the use of antihypertensive medications in primary care: a cluster-randomized controlled trial. *Am J Med* 2005;118:521–8. <https://doi.org/10.1016/j.amjmed.2004.12.023>.
- [22] Simon SR, Rodriguez HP, Majumdar SR, Kleinman K, Warner C, Salem-Schatz S, et al. Economic analysis of a randomized trial of academic detailing interventions to improve use of antihypertensive medications. *J Clin Hypertens* 2007;9:15–20. <https://doi.org/10.1111/j.1524-6175.2006.05684.x>.
- [23] De Vries H. An integrated approach for understanding health behavior; the I-Change model as an example. *Psychol Behav Sci* 2017;2:555585. <https://doi.org/10.19080/PBSIJ.2017.02.555585>.
- [24] Boudreau F, Dagenais GR, de Vries H, Walthouwer MJL, Côté J, Turbide G, et al. Effectiveness of a web-based computer-tailored intervention promoting physical activity for adults from Quebec City: a randomized controlled trial. *Health Psychol Behav Med* 2020;8:601–22. <https://doi.org/10.1080/21642850.2020.1850287>.
- [25] Smit ES, Hoving C, de Vries H. Does a typical contemplator exist? Three clusters of smokers in contemplation. *Health Educ Res* 2010;25:61–73. <https://doi.org/10.1093/her/cyp059>.
- [26] De Ruijter D, Smit ES, de Vries H, Hoving C. Dutch practice nurses' adherence to evidence-based smoking cessation treatment guidelines. *Fam Pr* 2017;34:685–91. <https://doi.org/10.1093/fampra/cmx039>.
- [27] Pluggen S, Hoving C, Vonken L, Schaper NC, de Vries H. Exploring factors influencing recruitment results of nurses recruiting diabetes patients for a randomized controlled trial. *Clin Trials* 2020;17:448–58. <https://doi.org/10.1177/1740774520914609>.
- [28] Moyers TB, Rowell LN, Manuel JK, Ernst D, Houck JM. The motivational interviewing treatment integrity code (MITI 4): rationale, preliminary reliability and validity. *J Subst Abuse Treat* 2016;65:36–42. <https://doi.org/10.1016/j.jsat.2016.01.001>.
- [29] Lau R, Stevenson F, Ong BN, Dziedzic K, Treweek S, Eldridge S, et al. Achieving change in primary care—causes of the evidence to practice gap: systematic reviews of reviews. *Implement Sci* 2016;11:40. <https://doi.org/10.1186/s13012-016-0396-4>.
- [30] Renn BN, Areán PA, Raue PJ, Aisenberg E, Friedman EC, Popović Z. Modernizing training in psychotherapy competencies with adaptive learning systems: proof of concept. *Res Soc Work Pr* 2021;31:90–100. <https://doi.org/10.1177/1049731520964854>.
- [31] Monsivais DB, Nunez F. Simulation to develop teaching competencies in health professions educators: a scoping review. *Nurs Educ Perspect* 2022;43:80–4. <https://doi.org/10.1097/01.NEP.0000000000000896>.
- [32] Krebs P, Prochaska JO, Rossi JS. A meta-analysis of computer-tailored interventions for health behavior change. *Prev Med* 2010;51:214–21. <https://doi.org/10.1016/j.ypmed.2010.06.004>.
- [33] Schermer TR, Akkermans RP, Crockett AJ, van Montfort M, Grootens-Stekelenburg J, Stout JW, et al. Effect of e-learning and repeated performance feedback on spirometry test quality in family practice: a cluster trial. *Ann Fam Med* 2011;9:330–6. <https://doi.org/10.1370/afm.1258>.
- [34] Pluggen S, Hoving C, Schaper NC, de Vries H. A web-based program to improve treatment adherence in patients with type 2 diabetes: development and study protocol. *Conte Clin Trials* 2018;74:38–45. <https://doi.org/10.1016/j.cct.2018.10.002>.
- [35] Pluggen S, Candel M, Hoving C, Schaper NC, de Vries H. A Web-Based computer-tailored program to improve treatment adherence in patients with type 2 diabetes: randomized controlled trial. *J Med Internet Res* 2021;23:e18524. <https://doi.org/10.2196/18524>.
- [36] Walthouwer MJL, Oenema A, Lechner L, de Vries H. Comparing a video and text version of a web-based computer-tailored intervention for obesity prevention: a randomized controlled trial. *J Med Internet Res* 2015;17:e236. <https://doi.org/10.2196/jmir.4083>.
- [37] Cook DA, Levinson AJ, Garside S. Time and learning efficiency in Internet-based learning: a systematic review and meta-analysis. *Adv Health Sci Educ Theory Pr* 2010;15:755–70. <https://doi.org/10.1007/s10459-010-9231-x>.
- [38] Noordman J, van der Weijden T, van Dulmen S. Effects of video-feedback on the communication, clinical competence and motivational interviewing skills of practice nurses: a pre-test posttest control group study. *J Adv Nurs* 2014;70:2272–83. <https://doi.org/10.1111/jan.12376>.
- [39] Soetens KCM, Vandelanotte C, de Vries H, Mummery KW. Using online computer tailoring to promote physical activity: a randomized trial of text, video, and combined intervention delivery modes. *J Health Commun* 2014;19:1377–92. <https://doi.org/10.1080/10810730.2014.894597>.
- [40] Smits N, Cuijpers P, van Straten A. Applying computerized adaptive testing to the CES-D scale: a simulation study. *Psychiatry Res* 2011;188:147–55. <https://doi.org/10.1016/j.psychres.2010.12.001>.
- [41] Short C, Smit ES, Crutzen R. Measuring psychological constructs in computer-tailored interventions: novel possibilities to reduce participant burden and increase engagement. *Eur Health Psychol* 2022;22:801–15. <https://doi.org/10.31234/osf.io/hz593>.
- [42] Naughton F, Hopewell S, Lathia N, Schallbroeck R, Brown C, Mascolo C, et al. A Context-Sensing mobile phone app (Q Sense) for smoking cessation: a mixed-methods study. *JMIR MHealth UHealth* 2016;4:e106. <https://doi.org/10.2196/mhealth.5787>.
- [43] Vervloet M, van Dijk L, Santen-Reestman J, van Vlijmen B, Bouvy ML, de Bakker DH. Improving medication adherence in diabetes type 2 patients through Real Time Medication Monitoring: a randomised controlled trial to evaluate the effect of monitoring patients' medication use combined with short message service (SMS) reminders. *BMC Health Serv Res* 2011;11:5. <https://doi.org/10.1186/1472-6963-11-5>.