
Research Article

Developing a Longitudinal Program to Improve Medical Students' Wellbeing: A Design-based Educational Research Approach

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Abstract

Many medical students suffer from mental health problems, raising concerns about their sustainable employability and subjective wellbeing. Therefore, we decided to design a wellbeing program building on the paradigm that in order to sustainably take care of others, (future) health professionals should take care of their own wellbeing first. The study aim was to design a theory- informed program on student wellbeing allowing students to acquire skills in this regard. In this paper, we describe the iterative design process and the results of our longitudinal proactive wellbeing program. We conducted an educational design approach to construct the program in order to simultaneously gain new insights and develop practical solutions. We implemented the 4 phases of educational design research over the course of two academic years. Phase 1 consisted of a review of the literature and a context and needs analysis in order to draft design principles and requirements. Phase 2 consisted of the cyclical and iterative process of design, construction and interim evaluation and adjustments of the wellbeing program (WB-program). In phase 3, evaluation and reflection, the program was implemented and evaluated. Phase 4 consisted of ongoing maturation and theoretical understanding of the program. With our approach we were able to design, construct and evaluate an evidence-informed longitudinal proactive WB-program for all bachelor of medicine students at our faculty. The most noteworthy result thus far is that students who are exposed to this longitudinal WB-program learn to value the importance of self-care and wellbeing and develop skills in this regard. Taken together, our study suggests that it is possible to integrate wellbeing in a core undergraduate curriculum on a large scale. We therefore consider the results of this educational design-based development of our WB-program as a proof of concept for a longitudinal integrated program to support student wellbeing.

Keywords: Student wellbeing; Design based educational research; Curriculum development; Mental health.

Introduction

Scientific as well as popular media report historically high levels of mental health concerns among medical students [1, 2]. Some already suffer from burnout before even starting their professional career [3, 4]. This raises many concerns about the sustainable employability and subjective wellbeing of these future healthcare professionals, since workload is bound to increase during their professional life [5]. Stress and mental illness levels are high among medical interns, and recent surveys revealed that up to 25% of them consider cessation of their postgraduate medical specialty training for this

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reason [6, 7]. These mental health concerns are not limited to medical students; they are widely spread throughout the academic world [8, 9]. Many universities have recognized issues regarding students' personal development and subjective wellbeing and invested in mental health services, tutoring and wellbeing programs [10-12]. Despite all these initiatives, psychosocial distress and mental health problems remain substantial [8, 11, 13, 14]. This might be related to the structure of programs that focus on counselling and support when distress arises, but only partly on maintaining or improving subjective wellbeing. Moreover, most programs with regard to mental health, tutoring and wellbeing are organized outside core curricula and are mostly reactive and problem-solving in nature. However, there are far fewer proactive or preventive programs that focus on coaching and improving subjective wellbeing. The lack of preventive programs implies that students who are experiencing uncomplicated academic and personal development, but could benefit from these programs as well, are overlooked [15-18]. Improving subjective wellbeing throughout the entire student population carries the additional benefit of building resilience against mental illness and improving subjective wellbeing [19]. We propose that it is of vital importance for all students to receive training in order to acquire the skills that have been shown to be of essential importance for a successful professional and personal life [19-22]. In the past few months, several authors made moving pleas to focus on developing the student as a whole, since mental health and subjective wellbeing are vital for student success, and to change university culture in this regard [9, 14]. Moreover, increasing stress levels in medical students and physicians not only undermine their subjective wellbeing but also put the quality of patient care at risk [4, 14, 23]. In contrast to the majority of academic studies, a personal-professional development program is part of most medical undergraduate curricula [24, 25]. However, these programs are often short or with low intensity [26, 27]. Several years ago, our medical faculty recognized the major wellbeing challenges among students and young graduates and called for strategies to improve student wellbeing. Therefore, we decided to develop a longitudinal program – aiming to improve student wellbeing – integrated in our medical undergraduate curriculum that is based upon self-determination theory and lifelong learning principles [28]. Research on self-determination and lifelong learning suggests that supporting personal development and psychological needs may help to protect students' subjective wellbeing and enhance their growth as well as improve the quality of patient care [29-31]. We therefore designed this wellbeing program building on the paradigm that in order to sustainably take care of others and deliver high-quality and safe patient care, (future) health professionals should take care of their own wellbeing first. The aim of this research was to design a theory-informed program on student wellbeing allowing students to acquire skills in this regard. In this paper,

we describe the iterative design process and the first results of our longitudinal program on student wellbeing.

Methods

Setting

This study was conducted at the Faculty of Medical Sciences of the Radboud University Nijmegen, the Netherlands and describes the design, adjustments and evaluation of our new longitudinal program on student wellbeing (WB-program).

Context and setting

Our medical faculty features a compulsory longitudinal professional development (LPD) program embedded into the core curriculum.[32] The Dutch undergraduate medical program lasts six years in total and comprises two phases of each three years, namely the Bachelor's and the Master's program. This differs from the majority of international medical programs, which span four years and are preceded by a pre-med preparatory program. Figure 1 shows a visual comparison of these curricula. The LPD program is organized in groups of eight students and one teacher-coach and covers the entirety of the three-year bachelor curriculum of medicine. Every year, each student attends six individual coach sessions with the teacher-coach and eight group meetings [32]. All bachelor of medicine students at Radboudumc participate in the LPD program (~1000 students). The WB- program is offered in the same small student groups, consisting of approximately eight students and one teacher-coach, as in the LPD program.

Timeline

This study took place between March 2019 and September 2021. From March 2020 onwards, the entire world faced the COVID-19 pandemic. The design of our WB-program seemed almost serendipitous in its timing. We will reflect on this in the discussion section of this paper.

Design

We used an educational design approach to construct the program in order to simultaneously develop new insights and practical solutions, which is important when designing and developing new educational programs [33]. We formed a design group consisting of a core of two physician educators and one educationalist and invited undergraduate students, young professionals, medical educators and student counselors to participate and collaborate. We implemented the four phases of educational design research as follows [33]. Phase 1, the orientation phase, consisted of a review of the literature as well as a context and needs analysis to acquire understanding of the problem, in order to draft design principles and requirements (March 2019–August 2019). Phase 2 consisted of the cyclical and iterative process of design, construction and interim evaluation and adjustments

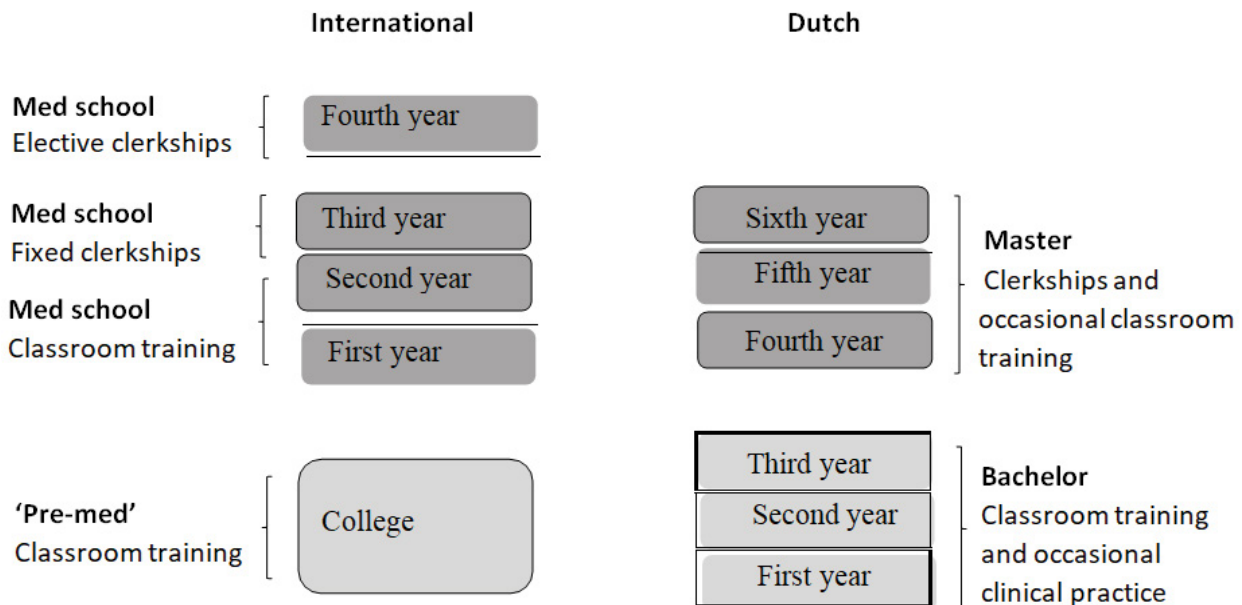


Figure 1: Undergraduate medical curricula

of the WB-program (September 2019–July 2020). In phase 3, evaluation and reflection, the program was implemented and evaluated (September 2020–June 2021). Phase 4 consisted of the ongoing maturation and theoretical understanding of the program (from September 2021 onwards). The different phases are closely linked and merge into one another as depicted in Figure 2, which summarizes the phases and data-collection activities. Phases 1–3 are discussed in detail in the Results section; phase 4 is discussed in the Discussion section.

Evaluation (Phase 3)

In May 2021, at the end of academic year 2020/2021, the developed WB-program was evaluated in phase 3, using a combination of structured group discussions and an individual online survey. At the end of the final education session of the year, every student group of second- and third-year bachelor students participated in a structured group discussion, based upon several open-ended questions (Table 1) [34, 35]. Every group as a whole wrote down their collective answers in an online database (Lime survey). Next to the questions that were discussed in the group, every student filled out a personal online survey with both open- and close-ended evaluation questions (Lime survey) (Table 1). The narrative answers on the open-ended questions were independently reviewed by two authors (RH and AJT); themes emerging from these responses were identified and analyzed [36]. These themes were then discussed in the research team (RH, AJT, RL and MvdP); discrepancies were resolved by consensus discussion. Likert scales (Table 1) were used to quantify the close-ended questions.

Table 1: Outline of evaluation survey

Panel discussion questions
· What are positive elements of the WB-program?
· What are negative elements of the WB-program?
· What did you learn from the program?
Individual questions: on a Likert scale from 1 to 5/6
· At every individual conversation with my teacher-coach, I discuss my subjective wellbeing (never–always, 1–5)
· The topics of the WB-program are useful for my personal development (not at all–very, 1–6)
· I find the teaching methods of the WB-program appealing (not at all–very, 1–6)
· I appreciate the amount of attention that is paid to my wellbeing (too little–too much, 1–5)
Individual open-ended question
· Did your behavior change with regard to maintaining your wellbeing?
o If it changed, in what way?
o If not, why not?

Results

Phase 1: Analysis and exploration

The design process started in 2018 after alarming reports about deteriorating wellbeing and increasing stress levels among (medical) students [1, 38]. Two physician educators (RH and MvdP) with extensive experience in coaching and mentoring and an educationalist (AJT), who is also a student counselor, formed the design group. The design group started

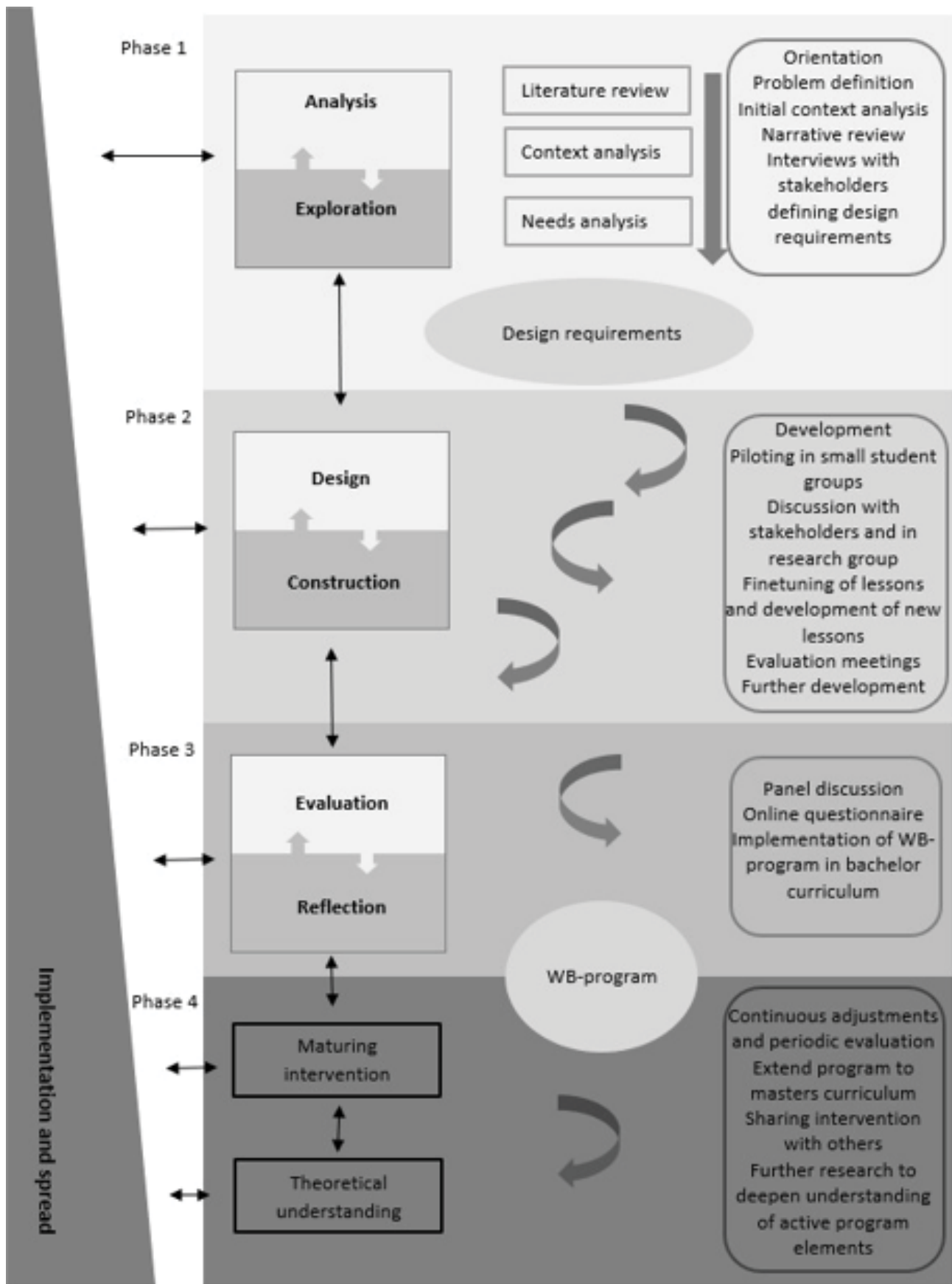


Figure 2: Schematic outline of the design process

the project with exploring the problem through discussions with students, student counselors and teachers (initial orientation).

These informal discussions took place during regular drop-in hours, coffee breaks with students, and after educational evaluations and regular faculty meetings. These first discussions led to a broad problem definition and background questions: What are effective solutions and preventive measures to reduce mental illness and incorporate the promotion of wellbeing? How can we educate students in this regard?

In order to answer these questions, the design group held interviews with stakeholders (see Appendix A) and subsequently studied written reports about student wellbeing in the Netherlands (initial context analysis). Based upon these, the design group conducted a narrative literature review that served as a starting point for the in-depth stakeholder interviews and the definition of the design requirements (context and needs analysis). Appendix A provides a more detailed step-by-step overview of the narrative review process. Based upon the literature review, the design team concluded that brief positive psychology interventions can enhance subjective wellbeing; however, most effects last only a short time and most studies had small sample sizes [39-42]. The need to invest in student wellbeing has been assimilated, over the past decade, by the health sciences; most investments are brief or positioned outside the core curricula [19, 27]. Providing an effective learning environment for the improvement of subjective wellbeing asks for transformative educational approaches [27, 43-45]. Results of the narrative review were discussed with stakeholders, which led to the following problem definition: Can we improve subjective wellbeing of medical students with an educational program? And how can we do that? The corresponding generated design requirements are depicted in Table 2. This resulted in the following design proposition: ‘To design a longitudinal preventive and proactive wellbeing program for students, in order to improve their subjective wellbeing.’

Table 2: Design requirements for the first cycle of design and development of a wellbeing program

Design requirement
· Develop a longitudinal wellbeing program for students that stimulates lifelong learning
· Create a preventive and proactive program
· Integrate the program in the curriculum
· Focus on improving wellbeing and resilience
· Normalize stress and setback (every person will face those)
- Provide back-up plan for coaching/counseling and referral for students with serious mental health issues

Phase 2: Design and construction

The development team consisted of the design group (RH, AJT and MvdP) regularly consulting students, teacher colleagues, clinician colleagues and student counselors to test ideas, teaching methods and the program outline.

First design cycle: In September 2019, we piloted the first few educational components and outline of the program for first- and second-year bachelor students. The first design cycle comprised self- study assignments with additional literature, brief web lectures and accompanying group sessions. The program was developed as a ‘buffet,’ inviting students to mix and match modules to their own liking. Lessons were divided into themes and placed on our digital learning environment platform (Brightspace). Prior to a coach-group session, the student group collectively selected a lesson of their choice from the WB-program website and prepared the group session. In every coach-group session from the LPD program, 30–60 minutes were reserved for the lesson from the WB-program. Every teacher-coach undergoes training in coaching and mentoring skills, with regular participation in training sessions and peer evaluations throughout the year. As part of the design-cycle, a general teacher meeting was organized for teacher-coaches to prepare them for the innovative teaching methods of the WB-program. Additionally, a comprehensive teacher manual was created for each component of the WB-program. During the first quarter (September 2019–December 2019), the design group regularly contacted groups of students and their teacher-coaches to discuss the experiences with the WB-program. Students as well as teacher-coaches appreciated the themes of the WB-program and reported needing more guidance to achieve the learning objectives. The purpose of design cycles and testing is to reinforce and validate principles for the design. After the first testing, we added more educational instruction for both students and teacher-coaches. At the end of the first semester (February 2020), we ran a short online survey to ask all participating students what they learned from and missed in the WB-program. Overall, students stated that the key learning experience of the new WB-program was the realization of the importance of taking care of their own wellbeing. There was much appreciation for the topics, and students asked for more practical tools. As one student described it very aptly in the online survey: “How can I improve or maintain my subjective wellbeing on a daily basis, please provide some tools or tips and tricks.” One of the important learning points from testing and adjusting the interim evaluation was the validation of the design requirements. However, the WB-program needed further development: the outline of the WB-program on the digital learning platform needed refinement, and not all lessons were intuitive enough and required practical tools to help students implement taking care of their wellbeing.

Second design cycle: Upon the results of the short online survey and informal discussions with colleagues and

student counselors, great effort was invested in creating more interactivity and practicality in the lessons. The adjusted WB-program was implemented during the second semester. At the end of that semester (July 2020), 14 students volunteered to participate in an individual interview with the design group, invited by their teacher-coaches. The interviews confirmed the earlier findings that students highly appreciate the content of the WB-program. During the lessons, students start to conceptualize the elements of their individual wellbeing and develop a vocabulary in this regard. Several students expressed their desire for more exercises stimulating in-depth discussions about wellbeing with their fellow students, because this stimulates normalizing the need for consideration about wellbeing. As one student stated: “In one of the lessons, I discovered that my fellow students have the same uncertainties as I have.” While students appreciated the WB-program in general, they preferred a longitudinal design with mandatory topics as opposed to the current mix-and-match cafeteria model (‘buffet’). One student described it as follows: “There are so many lessons and topics to choose from; how do I know what will teach me the most valuable lessons...?” All students would prefer a longitudinal program with a gradual build-up of the topics and still more practical assignments, starting with the ‘lighter’ topics and working their way up toward interpersonal development with regard to wellbeing. One student stated: “If I can choose, I tend to avoid heavy topics even though I learn the most from them.” Some topics needed additional repetition and elaboration with regard to integration of the WB-program with the LPD program. New topics that emerged from the individual interviews were ‘reloading and rest’, as well as ‘transition stress’ (from high school to university).

Third design cycle: Based upon the individual interviews, we restructured the existing content of our WB-program from a ‘buffet’ to a program with a step-by-step structure in order to guide students in their development. We integrated and connected the WB-program with the structure and the gradual build-up of the LPD program. The outline of the final WB-program is depicted in Table 3. Typically, students prepare by studying background materials and watching a concise web lecture or e-learning module. Within group sessions, we delve further into the subject through a blend of experiential learning, hands-on exercises (including mindfulness activities, time management games, language exercises, etc.), and in-depth discussions. Our teacher-coaches receive training in identifying issues among students. Given that our WB-program covers topics that can be challenging for students, particularly those with pre-existing mental health concerns, we have placed special emphasis on this aspect in the teacher manuals. In addition, we rescheduled the layout of our digital learning environment platform (Brightspace) to both visualize the main themes of the program and provide guidance in counselling and referral possibilities (Figure 3). The result of our iterative design and construction process

was a longitudinal WB-program for all bachelor of medicine students that is embedded in the curriculum and its LPD program.

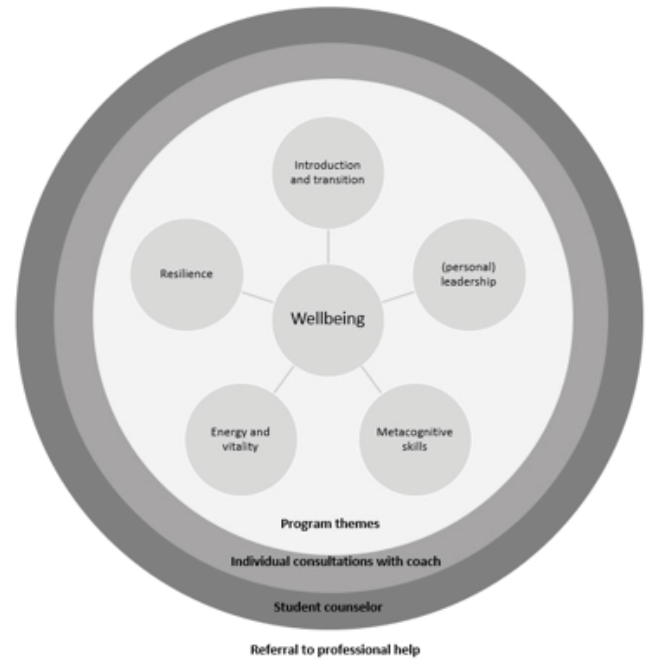


Figure 3: Thematic layout of the WB-program

Table 3: Designed wellbeing program in relation to the professional development program

Structure	
Per academic year:	
· 6 individual coaching sessions	
· 8 group sessions, 2 hours	
o 30–60 minutes: group coaching	
o 30–60 minutes educational content on professional development	
o 30–60 minutes focus on a wellbeing topic	
· Self-study and practical assignments	
Professional development program	Wellbeing program*
· Basic skills	Semester 1
o Self-reflection, feedback, collaboration, goal-setting, professional responsibilities	· Introduction to wellbeing, transition, sleep and exercise, wellbeing and the brain, procrastination and motivation
· Critical thinking, life-long learning	Semester 2
· Study/career orientation, professional attitude	· Learn how to learn, the language of wellbeing, stress explained, performance anxiety
o Healthcare developments	Semester 3

o Current affairs	· Personal leadership, proactivity, motivation, resilience
· Group coaching	Semester 4
o Exchange learning experiences	· Happiness or stress, positive psychology, prioritize
o Connection with WB-program Skill training in the WB program	Semester 5
	· Expressing feelings (new vocabulary), stress, distress, flow, empowerment
	Semester 6
	Happiness (4 lessons), thinking fast and slow, exercise and sleep

Phase 3: Evaluation and reflection

As of September 2020, the WB-program has been implemented in all three years of our bachelor of medicine curriculum (Table 3 and Figure 2). In May 2021, at the end of academic year 2020/2021 all student coach-groups of bachelor years 2 and 3 participated in the structured group discussion (80 coach-groups of eight; 640 students in total). 74% of these students (476 students: 231 second-year students and 245 third-year students) also filled out the individual online questionnaire.

Analysis of the structured group discussions

Analysis of the Likert-scale questions: Over 82% of the student coach-groups (score ≥ 4 on a 5-point scale) report discussing their subjective wellbeing always with their teacher-coach during their individual meetings. The topics of the WB-program are considered useful or very useful for their personal development by 81% (score ≥ 4 on 6-point scale). When queried about the teaching methods of the WB course, 62% (score ≥ 4 on 6-point scale) found them appealing. The balance in the course could be improved. About 63% thought the amount of attention paid to wellbeing in the program is exactly right (score 3 on a 5-point scale), 15% thought there was too little attention (score 1 on a 5-point scale) and 22% considered it too much (score 5 on a 5-point scale).

Analysis of the narrative group answers: The structured group discussions were centered around three open-ended questions (see Table 1). Several themes emerged as positive elements of the WB-program. The most important and most frequent mentioned was the mere fact that wellbeing is on the agenda. One student coach-group summed it up with: “It is very instructive to make wellbeing a priority in education as well. Through discussions with other students, we personally grow, and we realize that we are not alone. We are often in the same boat and can learn from each other.” Other important positive themes that emerged from the group answers were: ‘many topics to choose from’ and ‘a variety of assignments

and lesson types.’ One coach-group stated: “Some lessons don’t seem interesting at a first glance, but because we discuss them in the group, we always learn something from them.”

On the negative side, some student groups would prefer more interaction in the lessons, and they missed long-term goals or learning objectives. One coach-group wrote: “It would help if we were stimulated to define long-term goals with regard to our personal wellbeing and that necessary topics are repeated.”

The content of the program is based on scientific evidence about the specific topics. Some student groups valued discussion about the scientific background, while other groups preferred the more practical lessons.

When asked, ‘what did you learn from the program?’, all coach-groups responded that they learned how important self-care and wellbeing are and received practical and scientific based tools to maintain and improve subjective wellbeing. One of the coach-groups gave the following answer: “The combination of studying wellbeing literature with practical assignments on the topic really inspired us to pay more attention to self-care.” Moreover, the coach-groups appreciated that the WB-program is taught in the same student coach-group as the professional development (LPD) program, which guaranteed a well-known and trusted group environment enabling informative discussions. The program stimulates an environment that is open to discussing mental health issues and guides students who need professional help in a stepwise approach toward professional healthcare.

Analysis of responses of individual questionnaire

Analysis of the narrative individual answers: In the individual open-ended questions, students gave us useful insights in how they could apply the learning objectives of the WB-program into their lives. About half of the students responded that they initially found it difficult to name behavioral changes with regard to their wellbeing. However, many students mentioned in their narrative responses that the fact that attention is paid to wellbeing made them somehow feel better. Students who were able to define behavioral changes mentioned ‘practicing gratitude,’ ‘eating healthier,’ ‘following a stricter sleep regime,’ ‘being able to discuss my feelings with others’ and ‘reframing stress.’ One student wrote: “I feel more reflective now and am able to deal with stress in a different way. A bit of pressure helps me to perform better, too much stress asks for a period of rest.”

The importance of discussing topics related to wellbeing became evident from both the group and individual answers.

Discussion

With our educational design-based approach to construct a wellbeing program, we were able to design, construct and evaluate an evidence-informed longitudinal proactive

wellbeing program for all bachelor of medicine students at our faculty. This study makes an important contribution to the development of longitudinal integrated wellbeing programs. To our knowledge, this is the first study to develop and evaluate the effects of a longitudinal course on subjective wellbeing that is fully integrated in the bachelor of medicine curriculum. Working through iterative cycles of design and interim evaluation offered new theoretical and empirical knowledge on what elements in education can improve student wellbeing. Previous research has established that wellbeing can be taught and can exert small increases in subjective wellbeing [22, 40, 46]. Our results suggest that integrating a longitudinal and proactive WB- program into the bachelor curriculum enables students to actively change their behavior with regard to maintaining and improving their subjective wellbeing. A systematic review by Wasson et al. showed that there is limited evidence that learning environment interventions can improve medical student wellbeing [27]. However, most studies in that review were focused on supporting students with mental health issues instead of coaching mentally healthy students toward sustainable wellbeing.

A study by Greeson et al. found reduced stress and anxiety, better mood and higher distress tolerance after a short four-week workshop program [47]. Against this background, our program is longitudinal during the entirety of our three-year bachelor curriculum and includes a combination of practical and theoretical lessons. Therefore, we expect the program to have a lasting effect on the subjective wellbeing of our students, especially since the majority of students were able to make behavioral changes. A recent study by Dewa et al. – integrating a seven-lesson mental wellbeing course in the graduate plant biology program – showed behavioral changes with regard to positive wellbeing in their students as well [48]. Acquiring practical skills and making behavioral changes positively influences wellbeing and may also stimulate an attitude of lifelong learning that is necessary for every medical professional [29, 49].

Strengths and limitations

Our study has several important limitations. First, the program is developed based upon a needs analysis of a narrative review, not a systematic one. It is therefore possible that we missed publications about student wellbeing that could have deepened our understanding of the topic. However, we used the literature review as a basis for discussions with a broad panel of stakeholders with extensive experience in the field of wellbeing, which was part of our iterative process and enabled us to define design requirements for our WB-program. Before future adjustments of our program, we will expand our literature review. A second limitation concerns the fact that the first evaluation of the WB-program is evaluated by second- and third-year students. Due to logistics in the end-of-year program, the first-year

students were not able to participate in the panel discussions. Fortunately, first-year students did participate in the interim evaluations. Moreover, the second- and third-year students who participated in the evaluation did participate in the first-year program in academic year 2019–2020. In our ongoing further development in the future, we will include first-year students' evaluations as well. A third limitation concerns the unavailability of long-term evaluations of the WB-program. Our evaluation results indicate behavioral changes in students, which instills confidence regarding the long-term outlook [39, 50]. Phase 1 and the start of phase 2 of the design of the WB-program took place before the COVID-19 pandemic. Further iterative design, implementation and evaluation occurred largely during the COVID-19 pandemic, which might have influenced our findings, since the mental health of society at large was under pressure due to all COVID-measures [51, 52]. We consider it positive that we were able to support students in actively change their behavior toward maintaining subjective wellbeing during these challenging times regarding the COVID-pandemic. It is possible that the subject of our program gained momentum due to the heightened demand for it during these challenging times. Attendance at coach-group meetings and participation in the WB program are compulsory, and this requirement might have influenced the outcomes of our design. However, previous evaluations of our LPD-program, of which the WB-program is part, have shown that students value the mandatory aspect as it assists them in addressing challenging subjects [32]. Should a particular topic provoke significant discomfort, individual students always have the option to hold back somewhat in group meetings. In such cases, the teacher-coach can address this matter during follow-up one-on-one conversations with the student. If there are significant mental health concerns, the student can be referred to the appropriate resources (see Figure 3). Our study has several strengths as well. First, we used a systematic educational design base, which is suitable for developing innovative educational programs [33]. Second, we involved a large interdisciplinary group of stakeholders, including many students, and we adjusted the program to emerging insights. A third strength is the fact that our WB-program normalizes talking about wellbeing and mental health, which empowers students in this regard. And fourth, the WB-program is fully embedded in our bachelor of curriculum, which emphasizes the importance of wellbeing and self-care.

Phase 4: Ongoing maturation and theoretical understanding of the program

The most noteworthy result from our WB-program thus far is that students who are exposed to a longitudinal program with recurring focus on improving and maintaining wellbeing learn to value the importance of self-care and wellbeing and develop skills in this regard. We consider the results of this educational design-based development of our WB-program

as a proof of concept for a longitudinal integrated program. We would like to share the chief lessons we learned during the research, design and evaluation process. Firstly, involving students in all phases of the process enables the alignment the program to their needs. Different students have different needs with regard to maintaining and improving their wellbeing. In the ongoing maturation, we therefore aim to further develop the WB-program with both students and experts from different fields of wellbeing research. Currently we are also expanding the WB-program to our master's curriculum to further ensure persistent behavioral changes. Secondly, students considered that a safe environment is important to discuss their wellbeing concerns with peers. We think that the already existing student coach-groups contributed to the positive results and advise curriculum designers to take this into account when designing a program. Thirdly, further research is necessary to deepen our understanding of the active elements and to help us to improve the WB-program. Moreover, we need to further investigate how to support lifelong learning with regard to maintaining subjective wellbeing after graduation, when other challenging factors such as work culture, workload and work-life balance put subjective wellbeing under pressure [4, 23, 29].

Conclusion

We developed a longitudinal proactive WB-program for bachelor of medicine students that contributes to positive behavior changes with regard to subjective wellbeing. Taken together, our study suggests that it is possible to integrate wellbeing in a core undergraduate curriculum on a large scale.

Declarations

Ethical approval and consent to participate

The research participants are not subjected to acts that are subject to the Medical Research Involving Human Subjects Act (WMO). On this basis, the Central Medical Ethical board region Arnhem-Nijmegen the Netherlands (CMO) declares that the research does not fall under the remit of the WMO (Dossier number: CMO-020-6518). Subsequently the research protocol was approved by the Research Board of the faculty of Medicine Nijmegen the Netherlands (Dossier number COMOS-4550714-4566939). All participating students and teacher/coaches gave written informed consent, which is faculty policy for all research conducted at our medical faculty in which people participate.

Consent to publish

All data are anonymized, no identifying information is present (consent identifying information: not applicable).

Research code of conduct

The research is conducted in accordance with the Declaration of Helsinki and the Netherlands Code of Conduct

for Research Integrity (Netherlands Code of Conduct for Research Integrity | NWO).

Availability of data and materials

All underlying data that are available upon request from the corresponding author

Funding: No funding

Conflicts of interest: None

Author contribution

Ron Hameleers and Marjolein van de Pol designed the study, Jasmijn Terlouw and Roland Laan were part of the research group discussing the design. Ron Hameleers, Jasmijn Terlouw and Marjolein van de Pol acquired and transcribed the data. Analyses were discussed in the whole research team. Ron Hameleers and Marjolein van de Pol drafted the article. Jasmijn Terlouw and Roland Laan improved the figures upon discussion. All authors reviewed the manuscript and agreed on the content.

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Availability: This paper is posted as a preprint [37].

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Initial orientation

Background problem and questions

The student population is facing historically high levels of mental illness. What are effective solutions and preventive measures to reduce mental illness and incorporate the promotion of wellbeing? How can we educate students in this regard?

Stakeholders

- At our university: Students and young professionals, educators, clinicians, student counselors, psychologists, pastors and researchers in the field of (student) wellbeing.
- At a national level: platform studentenwelzijn (student wellbeing platform) – educators and student ambassadors.

Initial context analysis

Discussions and interviews with stakeholders: During regular education evaluation meetings (groups of students and groups of teachers) the design team discussed the background problem and questions. Moreover, the design team held interviews with student counselors and teacher-coaches. Themes that emerged: Subjective wellbeing, pressure, stress/distress, burnout, resilience, positive psychology, (self-) reflection, lifelong learning, time management, vitality, student success, happiness versus depression, adolescence and emerging adulthood problems, meaningful life, reduce stress, social media stress and social comparison, relationships, self-determination, self-care, leadership, empowerment, enthusiasm/inspiration versus doubt, self-criticism, cynicism and emotional exhaustion, grit, compassion.

Written reports and platforms from stakeholder groups:

Actieplan Studenten Welzijn (action plan on student wellbeing): <https://www.ecio.nl/wp-content/uploads/sites/2/2020/10/Actieplan-Partnership-Studentenwelzijnversie-def.pdf>

Project plan to improve student wellbeing: <https://www.radboudnet.nl/nieuws-activiteiten/actuele-projecten/studentbegeleiding-2023/t4-studentenwelzijn/>

Student wellbeing plan: <https://www.inholland.nl/media/16741/onderzoeksagenda-onderzoekslijnen-studentenwelzijn-v10.pdf>

Dutch student wellbeing platform: <https://ecio.nl/landelijke-werkgroep-studentenwelzijn/>

Dutch Association for Medical Education (Nederlandse Vereniging voor Medisch Onderwijs). Working group wellbeing of (future) healthcare professionals : <https://www.nvmo.nl/index.php?page=76>

Discussions led to three central questions

1. What defines subjective wellbeing? (And on the negative

side: What causes pressure among students? What causes stress/distress? When do students experience burnout?)

2. What are the challenges and supportive strategies with regard to wellbeing, and how to improve resilience?
3. How can we support students in their personal and professional development? (Academic studies in general and medicine in particular place high demands on students. Self-regulation, self-determination [including lifelong learning] and self-care play an important role in both professional and personal development of students.)

Literature review

Narrative literature review

We performed a narrative review using a topical approach to search for pivotal information on the topic of student wellbeing and educating wellbeing. To familiarize ourselves with the topic of student wellbeing, we started with a broad Google search on student wellbeing in higher education. Based upon this initial broad search, we searched Web of Science, PubMed and Google Scholar for articles about ‘student wellbeing,’ ‘wellbeing interventions’ and ‘education.’ Additional records were identified by scanning the reference lists of relevant studies and reviews published until June 2019. Furthermore, we searched for gray literature (i.e., government documents, university websites and business and industry materials on the topic of wellbeing) and performed background reading in popular scientific books of authors who also published about wellbeing.

Resulting in:

1. Key articles on student wellbeing
2. University platforms and courses on wellbeing and mental health
3. Background information from popular scientific books

Key articles on student wellbeing

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- University of Chicago: <https://wellness.uchicago.edu/healthy-living/wellness-programming/>
- University of Amsterdam: <https://www.uva.nl/en/current/coronavirus/initiatives-and-help-for-students.html?cb>
- Melbourne University: https://melbourne-cshe.unimelb.edu.au/data/assets/pdf_file/0016/2302603/MCSHE-Student-Wellbeing-Framework_FINAL.pdf
- Newcastle University: <https://www.ncl.ac.uk/wellbeing/newseventsandprojects/initiatives/#pianosoncampus>
- University of Pittsburgh: <https://www.studentaffairs.pitt.edu/dean/healthandwellnessinitiatives/>
- Colorado State University: <https://health.colostate.edu/well-being/>
- Erasmus University Rotterdam: <https://www.eur.nl/onderwijs/studeren-rotterdam/studentenwelzijn/student-wellbeing-week>
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- Radboud University Nijmegen: <https://www.radboudnet.nl/nieuws-activiteiten/actuele-projecten/studentbegeleiding-2023/t4-studentenwelzijn/t4-nieuws-ontwikkelingen/hannah-markusse-coordinator-studentenwelzijn/>
- Harvard University – The Science of Happiness: <https://gened.fas.harvard.edu/classes/science-happiness>
- Pursuit of happiness.org: https://www.pursuit-of-happiness.org/the-science-of-happiness-course/?gclid=EAIAIQobChMIpenA45rU9QIVieF3Ch13Nwd6EAMyAYAAEgLyzvD_BwE
- UC Davis: <https://grad.ucdavis.edu/faculty-academy-graduate-student-well-being>

University platforms and courses on wellbeing and mental health

Search terms: university wellbeing initiatives, university and mental support/student support

- University of Bristol – Our Approach to Mental Health and Wellbeing: <https://www.bristol.ac.uk/university/governance/constitutionaldocs/senior-staff/vice-chancellor-and-president-professor-hugh-brady/wellbeing-strategies/>
- Yale University – The Science of Well-Being: https://www.coursera.org/learn/the-science-of-well-being?utm_source=gg&utm_medium=sem&utm_campaign=09-ScienceofWellBeing-ROW&utm_content=B2C&campaignid=9722859275&adgroupid=100391762620&device=c&keyword=online%20free%20

Background information from popular scientific books

Title book	Author	Year/edition
Resilient, find your inner strength	Rick Hanson	2018
Flourish	Martin Seligman	2012
Happier, can you learn to be happy?	Tal Ben-Shahar	2008
The luck factor	Richard Wiseman	2004
The seven habits of highly effective people	Stephen Covey	1989
Thinking fast and slow	Daniel Kahneman	2011
How to be miserable	Randy Paterson	2016
Leaders eat last	Simon Sinek	2017
How to stop feeling like shit	Andrea Owen	2018
Solve for Happy	Mo Gawdat	2018