

Education Against Tobacco



The global medical network Education Against Tobacco
volunteering for tobacco prevention

Abstract

Background

Tobacco remains the largest preventable health risk in Europe. Education Against Tobacco (EAT) is a multinational network founded by the medical student Titus Brinker at the University of Gießen in Germany in 2012. Today, EAT involves about 3.500 volunteering medical students from approximately 80 medical schools in 14 countries around the globe.

Objectives

The following review introduces the initiative EAT, its concept, as well as activities, aims and related studies.

Materials and methods

On the school level, the EAT programme addresses approximately 50,000 10-15-year-old adolescents per year in 14 countries by using an multimodal approach which takes advantage of the students smartphones by implementing self-developed apps (i.e. the facemorphing app “Smokerface”), which are also broadly used by the public (over 500,000 downloads).

The effectiveness of the school-based intervention is investigated by randomized trials, currently involving 20,000 students in Germany.

On an educational level, 13 (of 28 active) medical faculties in Germany implemented science-based modules into their curriculum to educate medical students for evidence-based smoking cessation counselling.

On a policy level, members of EAT organize themselves in tobacco control networks in physician associations after their graduation.

Results

A first long-term study showed evidence of a preventive effect with regard to the onset of smoking, especially among females, students with a low educational level or students with a migration background. The use of the facemorphing app Smokerface is fun for the students and motivates them not to smoke. The results of current long-term studies are still pending. Each year, several hundred medical students are trained in the courses to help patients quit and several thousand are sensitized for the global tobacco epidemic.

Conclusions

EAT motivates future doctors initially by school-based tobacco prevention to face the challenges of tobacco control in medical education and politics.

Introduction

Smoking is the main preventable cause of chronic diseases and premature death in Europe and worldwide [1]. Global mortality is estimated to double from 5 million a year (2010) to 10 million in the coming decades [4]. About a third of young adults are regular smokers and about half of them will die due to their addiction [5, 6]. In Germany, there is still a lot of work to be accomplished in terms of tobacco prevention. According to the World Health Organization (WHO), Germany ranks second to last in Europe in the field of tobacco prevention policy, only ahead of Austria [7]. For example, Germany is the last country in the EU28 where tobacco outdoor promotion is still permitted [8, 9].

In this context, the multinational network Education Against Tobacco (EAT) was founded in Germany in 2012. In the following we will present the initiative and its concept, as well as the various activities of the network in detail, followed by the results of the associated research carried out by EAT.

The Education Against Tobacco network

The multinational network Education Against Tobacco is an initiative founded in 2012, which involves more than 3,500 medical students in 14 countries (as of May 2018) engaged in tobacco prevention on a voluntary basis at around 80 medical faculties. EAT conducts science-based prevention seminars for over 50,000 secondary school students per year with novel methods such as smartphone facemorphing apps and sensitizes future clinicians to the dangers of smoking. To improve medical education, EAT initiated science-based optional courses at 13 medical faculties in Germany. The aim is to train future clinicians in professional tobacco cessation counselling in order to guarantee their numerous smoking patients the best possible assistance in smoking cessation. More than 500,000 smokers could be supported at no cost by the self-developed apps Smokerface and Smokerstop. The effectiveness of the measures carried out by EAT is constantly examined and improved by evaluation studies with currently more than 20,000 secondary school students involved. Sensitized medical students can get into dialogue with politicians of the German Parliament after their approbation in the „Ärzteverband Tabakprävention“ (Medical Association for Tobacco Prevention) [10, 11, 12, 13].

Stakeholder involvement

External funding is provided voluntarily by schools who mostly donate a small amount in return of the classroom visits or by parents via small private donations (less than 200 Euro). None of these donations comes with obligations for us to change our activities or from external companies or parties with competing interests. Our research projects are exclusively funded from the following organizations: German Heart Foundation, German Cancer Aid, German Lung Foundation and German Center for Lung Diseases. These institutions have no role in the design or conduct of the research they fund or on any other activities within the network. None of these institutions has any affiliations with the pharmaceutical industry or tobacco industry or other relevant competing interests.

Reduction of inequalities

The majority of our leadership is female and as can be seen from the pictures of our board meet ups (Fig. 2) the leadership comes from multiple cultural backgrounds. Our work in schools focusses primary on students with lower educational background as they have a higher smoking prevalence. In all of our evaluations (see below) effectiveness for different gender, educational level and migrational background are monitored and the curriculum to ensure optimization via focus interviews if inequalities are found.

Communication strategy (summary)

All of the 80 medical schools have a facebook page where they report on their local activities to attract other medical students to engage themselves. Many countries also have national pages (i.e. Germany: facebook.de/gegentabak or Brazil: facefacebook.com/eatbrazil/) that try to sum up national events. Other than that, we work with local newspapers but also get featured by big TV stations on world no tobacco day. New groups are founded by the networks popularity but also by the fact that it is often pro-actively recommended to friends from other medical schools (see funding/transferability PDF for details) . Both of our websites are search engine optimized and gegentabak.de participates in the google grants program for charities and is freely promoted via AdWords. Every group has a coordinator responsible for public relations (=a volunteering medical student) and their own creative ideas to generate publicity. A new group may be founded via the website by clicking on “start a new group” which leads to a step-by-step-guide (<http://educationtobacco.org/start-a-group/>). The leadership and the local groups organize via Facebook groups or WhatsApp groups.

The network's levels of intervention for tobacco prevention

Tobacco prevention on the school level

Most smokers start smoking in early adolescence [14]. According to a WHO report from 2016, 13% of German boys and 15% of girls at the age of 15 already smoke cigarettes at least once a week [15]. The prevalence of smoking increases to about one

third by young adults [16]. About half of young smokers already fulfill nicotine addiction criteria [17].

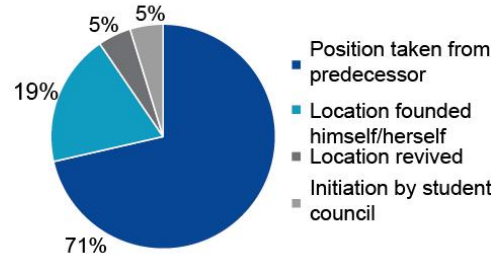
For this reason, EAT visits students in grades 6-8 of all school types to inform them interactively and at eye level about the consequences of smoking. The students are encouraged to make an informed and self-responsible decision about smoking. Medical students are potentially perceived as more authentic and accessible than teachers or doctors due to the narrower age difference. Prevention programmes carried out by doctors have already shown positive short- and long-term effects [18, 19]. However, these programmes are not as broadly spread and cost effective as EAT can be by using volunteer medical students as mentors [18, 19, 20]. The programme is based on a so-called combined social influence and social competence approach, which is being described in the literature as the most promising approach in school-based tobacco prevention [21]. Particular focus is placed on age-appropriate content and interactivity, as there are indications of greater effectiveness in motivating people to stop smoking if they have to work out the health consequences themselves instead of receiving a presentation of them [22].

EAT currently assists about 23,800 students per school year in German-speaking countries (an average of 700 pupils per university, 28 universities in Germany (Figure 1A), 4 in Austria, 2 in Switzerland) with about 1,500 volunteering medical students. Most of the local groups already exist successfully in their second generation (Figure 1B). The group leaders invest their time on a voluntary basis in coordinating the local groups (Figure 1C, Figure 2).

A EAT locations in Germany



B Leadership of local groups



C Voluntary investment of time per week

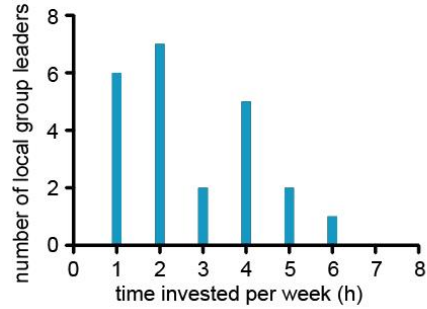


Figure 1: Education against tobacco groups at German medical faculties. A: EAT locations in Germany. B: Leadership of local groups. Results of the 2018 group leader survey on the question "How did you come to manage the site?" (n=23). C: Time investment per week. Results of the group leader survey 2018 on the question "How many hours do you invest in AGT per week?" (n=23)



Figure 2: Group leader of the Education Against Tobacco groups at the national meeting in Heidelberg. A: National meeting 2015 B: National meeting 2016 C: National meeting 2017

The Smokerface app and the mirroring approach – how does tobacco smoking change the appearance of my face?

The self-perceived outward appearance is the strongest predictor of self-confidence in adolescence [23]. Burford et al. were able to demonstrate in a randomized controlled study that a self-portrait (=selfie) altered by a desktop programme, which shows one's own face as a smoker vs. non-smoker several years in the future, has significant effects on the 6-month smoking prevalence in 18 to 30-year-old young adults (abstinence in the intervention group after six months = 27.5% vs. control group = 6.3%). The computer programme has also increased the motivation of 14- to 18-year-old women to quit [24]. However, these programmes are often expensive and not broadly available.

The strong interest of the young people for their appearance led to the development of the Smokerface app [23]. It graphically changes a user's selfie and predicts the changes in the face that would result from smoking one cigarette pack per day at different time points in the future (after 1, 3, 6, 9, 12 or 15 years) compared to non-smoking (Figure 3). The App algorithms take into account the user's current age and change the face due to published effects of smoking on appearance, such as increased risk of acne or paler skin due to reduced capillary perfusion (already after one pack year), as well as connective tissue damage and wrinkles [25, 26].

At the first the Smokerface app was only available in 2D. To make the app even more broadly accessible, the app was also released for smartphones, of which almost every young person owns one [27]. Furthermore, the app has been continuously improved, is now available with 3D animations and the user can interact with his own smoker face by touch. Using an explanatory graphic, the app also explains the positive aspects of non-smoking and the negative effects of smoking by comparing a non-smoker's face to an prematurely aged smoker's face [12].

The no-cost app, translated into the six most commonly spoken languages, is currently downloaded approximately 100 times a day.

In order to focus the application more intensively in school setting, the mirroring approach was developed: instead of the previously used computer version, the more recent smartphone version was used and the three-dimensional selfie was transferred from the student's smartphone or tablets provided via the beamer to the screen using mirroring software. Thus all classmates (and also the teachers) have the possibility to

react to the picture. These reactions influence the subjective norm, which has an influence on young smoking behaviour [28]. The application is explained with the help of a volunteer adolescent and the students are asked to describe the changes they have noticed. Afterwards, the medical students explained to the students why smoking causes them.

The Smokerface poster campaign: an alternative to supervised prevention programmes?

Most of the effective school tobacco prevention programmes require external mentors and are therefore not broadly available. Furthermore, such interventions are often associated with high costs and organizational effort, which obstructs a widespread implementation in schools [21]. Even if the EAT programme is less expensive and more wide-ranging than prevention programmes carried out by doctors due to the voluntary engagement of medical students, the capacities are still dependent on the availability of medical students. Therefore, an implementation method was designed that is independent of the limiting factors: a poster campaign promoting the facemorphing app is an inexpensive (less than 50 euros per school), broadly available, easy-to-use alternative or supplement to the existing prevention programmes.

The posters illustrate the effects of smoking on the face by comparing the future non-smoker face with the prematurely aged smoker's face (Figure 3). The poster also contains a request to the students to download the free app and discover what their personal smoker face would look like.

Non-smoker

Smokes for a year
(one pack a day)

Brittle hair

Higher risk for acne

Elastic fibers tear faster

Larger pores

Higher risk for pimples

Frequent colds

Yellow teeth, bad breath

Pale skin
(bad perfusion)

After 15 years...

Smokerface App

1 Get the free **Smokerface App**

2 Take a selfie.

3 See your future face as a smoker.

Figure 3a: Female Smokerface App-applicant poster that is hung up after the current intervention. Effects of the app on an example face. Left half of the face ages as a non-smoker; right half of the face ages when one packet of cigarettes is consumed per day.

Non-smoker

Smokes for a year
(one pack a day)

Brittle hair

Pale skin
(bad perfusion)

Elastic fibers tear faster

Larger pores

Frequent colds

Higher risk for pimples

Yellow teeth, bad breath

Higher risk for acne

After 15 years...

Smokerface App

1

Get the free
Smokerface App

2

Take a selfie.

3

See your future face
as a smoker.

Figure 3b: Male Smokerface App-applicant poster that is hung up after the current intervention. Effects of the app on an example face. Left half of the face ages as a non-smoker; right half of the face ages when one packet of cigarettes is consumed per day.

Optional university course on tobacco prevention for medical students

The activities of EAT presented so far are predominantly based on primary prevention, because the greatest health benefit for a person is undoubtedly achieved when nicotine addiction does not primarily occur and does not need to be treated [4]. Nevertheless, the smoke stop is often the most effective secondary and even tertiary preventive measure to prevent tobacco-related secondary diseases or to influence the course of diseases that have already occurred [29].

Despite the enormous importance of smoking cessation, studies show that tobacco addiction is not adequately treated in comparison with other chronic diseases such as diabetes or hypertension [30, 31, 32]. Possible causes mentioned are lack of motivation, untrained skills and lack of knowledge of suitable counselling strategies and treatment methods [30, 31, 32, 33]: In the context of several studies conducted at German medical faculties, less than 5% of students in the last year of their studies even remembered ever having been practically guided to counselling smokers [34]. More than half of the students would like to have an intensified teaching on tobacco addiction [35].

The education of medical students with regard to counselling and treatment of smoking patients is therefore in need of improvement. That is why EAT has introduced a science-based optional course at 13 medical faculties in order to address precisely these issues. Among other elements, students learn components of the 5A scheme for smoking counselling (Ask, Advise, Assess, Assisst, Arrange) and the effectiveness of medical measures and support methods. These are also practically experienced on theater patients. Furthermore, the students attend school visits as part of the optional course. At the end of the course the students should be able to elaborate a detailed, individual therapy recommendation based on a profound smoking anamnesis.

Through participation, prospective doctors are sensitized to the problems of smoking and trained in important didactic skills that will later be useful in patient consultations. For example, as mentors in the classroom, they learn to convey complex medical content in a comprehensible manner for students [36].

Literature shows that a course for medical students on health promotion through tobacco prevention among young people led to these medical students also raising the smoke status of their (older) patients more often and consulting on the issue of smoking [37]. In this context, it is likely that also volunteer mentors who have not taken part in

the optional course will provide their patients with better care with regard to their tobacco addiction.

Ärzteverband Tabakprävention / Medical Association for Tobacco Prevention

A main focus of EAT's activities is individual behavioural prevention. This is extremely important, but a combination with consistent policy of proportion prevention promises greater success in changing the external circumstances that contribute to the development of tobacco addiction and tobacco-related complications.

Our aim is therefore to reduce the prevalence of tobacco-related chronic diseases by initiating legislative measures. Through voluntary influence, doctors will engage in dialogue with local members of the German Parliament and convince political decision-makers in Germany to promote a legally based high level of tobacco prevention. Germany is far from this high level and is currently one of the most disadvantaged countries in Europe. Germany ranks second to last on the tobacco control scale, which measures the national implementation of measures that demonstrably reduce the prevalence of smoking in the population [7].

Through dialogue with the political bodies, a positive vote against the tobacco industry should promote the implementation of the measures already signed by Germany in 2003 under the WHO Framework Convention on Tobacco Control. The approach is based on internationally successful medical associations. The proposals include a complete ban on tobacco advertising, reimbursement by health insurance companies of the costs of smoking cessation measures, an increase in tobacco tax, improved protection for non-smokers and better education of the public about the consequences of tobacco consumption. Medical students who were sensitized to the issue by EAT during their studies can continue their engagement in the medical association. Also licensed doctors who are not EAT alumni can participate.

Internationalization of the programme

The tobacco addiction problem is not limited to Germany. Therefore, EAT's programme, initially only available in German-speaking countries, has been translated into various languages and is now implemented at over 80 medical faculties in 14 countries. Currently, about 21,000 pupils are covered by the locations outside the German-speaking area. The countries in which medical faculties have implemented the

programme are shown in Figure 4. The international locations organize themselves independently and work on an expansion of the programme within their own national borders, as well as on an expansion into equal-speaking countries. In addition to the school-based activity, own ideas and initiatives are also being launched, such as a social media competition on Facebook with the Smokerface App for World No Tobacco Day 2017 in Pakistan or the announcement of an award for tobacco control for the best idea for reducing smoking prevalence in Brazil.



Figure 4: Worldwide distribution of Education Against Tobacco (as of April 2018). In the countries marked in light grey are medical faculties where the programme has been implemented. At the top right of the picture you can see our logo, which is used consistently by all groups. Author of the graphic: Selina Schmidt and Benedikt Gaim (Board Coordination Europe).

Accompanying research -
Results of the evaluation studies

Tobacco prevention on the school level

In order to investigate and improve the effectiveness of the prevention programme developed by EAT, EAT carries out Germany's greatest multicenter studies on the subject of school tobacco prevention.

A first prospective, quasi-experimental study with about 1,500 included students on the effectiveness of school prevention programmes implemented by medical students on the reduction of smoking prevalence in 11 to 15-year-old students was already carried out by EAT in 2014 [10, 36]. The intervention consisted of EAT's original two-hour prevention programme. A patient with a tobacco related disease could be asked by the students about their motives and experiences with smoking. Significant effects on the smoke stop (=secondary preventive effects) could be proven. After six months, the intervention had a stronger secondary preventive effect on secondary school students than on comprehensive school students. A primary preventive effect (smoke entry) could not be determined after six months [10].

Based on the results of this study, the curriculum for school types with a lower level of education (comprehensive/secondary schools) was adapted to integrate student feedback and new approaches were sought that could particularly appeal to these young persons. The focus was placed more on the benefits of non-smoking rather than the devaluation of smoking, as studies have shown that medical prevention programmes focusing on deterrence and anxiety induction have no long-term effect on the reduction of smoking prevalence [20, 38, 39, 40, 41]. In contrast, a medical multimodal prevention programme in Berlin showed significant short-term effects on the onset of smoking in a quasi-experimental study. This could be a promising alternative to the traditional deterrent approach [19]. The Smokerface app developed by EAT was integrated into the curriculum for the first time in the original 2D computer version and each young person received his own redesigned selfie [10]. The randomized one-year follow-up study tested the effectiveness of the revised curriculum in smoking prevention in 11 to 15-year-old students [42]. In conclusion, this first long-term study of prevention programmes with smokerface intervention carried out by medical

students revealed evidence of a protective effect in terms of smoking, especially in female students (Number Needed to Treat (NNT) = 24) and students with a low educational level (NNT = 30, as opposed to NNT=199 in grammar schools) or students with a migration background (NNT = 44). This is compatible with other studies that attribute particular importance to self-perceived attractiveness as the strongest influence on self-confidence, especially for girls or students at lower educational levels [23]. Secondary preventive effects such as a motivation to stop smoking could not be shown in this study.

The mirroring approach, in which the smoker face of a voluntary youth is projected in front of the entire peer group, was tested at three secondary schools. Immediately after the intervention, the students were asked for their opinion on the intervention by means of an anonymous questionnaire. Most students stated that they enjoyed the intervention (77/125, 61.6%), motivated them not to smoke (79/125, 63.2%) and gave them previously unknown benefits of non-smoking (81/125, 64.8%). Only a minority partially or completely denied having learned new advantages of non-smoking (16/125, 12.8%) or not being motivated to non-smoking (18/125, 14.4%). 90% of the students considered the app to be a suitable measure to convince their classmates not to smoke [11].

In 2016, the EAT curriculum was further optimized based on the results of our own studies and other current research findings. Elements to enhance group effects (such as the mirroring approach) and to repeat what you have learned (such as app-advertising posters (Figure 3)) have been included. Long-term health effects were completely removed from the curriculum due to their ineffectiveness [43]. This is the most current version as it is currently (as of May 2018) in the classrooms. Its efficacy is being investigated in a currently ongoing controlled randomized study involving approximately 10,000 seventh-graders in 140 secondary schools. The primary endpoint is defined as the difference in the change in the percentage of smokers and non-smokers after 24 months compared to the baseline (difference of differences approach). The secondary endpoint is the change in students' attitudes to smoking (based on the theory of planned behaviour) in the two arms after 24 months compared to the baseline.

Illustration of the currently evaluated curriculum

The curriculum consists of a 45-minute auditorium presentation followed by a 90-minute classroom seminar. The first part takes place with all seventh graders in the assembly hall setting to reproduce the group effects that we were able to measure for the mirroring approach and to include the extended peer group of the students [11]. Furthermore, the increase of physical fitness through non-smoking and other age-appropriate topics such as saving money and the importance of addiction are taken up and finally an advertising analysis ("If you wanted to sell cigarettes to your classmates, how would you advertise them?") with analysis of real examples to strengthen social competence (local photographs of school bus stops that the student encounters in his or her everyday life) is carried out [21].

The following 90 minutes will be spent in the classroom going through an interactive station plan on four different topics in small groups put together by the students themselves. Medical students trained in advance through standardized mentor training part with each group and enter into a dialogue with an average of 6-7 students per small group. Mentor training is integrated into a process evaluation that determines whether the medical students who are training were able to convey the curriculum completely and profitably, and whether the medical students who being trained have also understood and are able to implement it. Within the framework of the station plan, the understanding of the basic damaging mechanisms of cigarette smoking in the body is to be worked out together with the students and linked with age-relevant examples. The aim is to strengthen the students' personal responsibility and self-confidence and to give them the opportunity for discussion with the students. The design of the station plan, the practical and interactive approach and the youth-oriented way of presentation are aimed at developing a positive non-smoking image among the students. The students carry out all experiments themselves to provide a better learning experience; the medical students essentially have a supervising and moderating function. With the help of experiments and hands-on exercises, the pollutants in cigarette smoke are to be visualised, the effects on one's own attractiveness made clear by the Smokerface app, and in the age group relevant physical advantages through non-smoking are to be identified and an understanding of the general mechanisms developed. The students discuss different stages of addiction development, their attitudes and personal experience to the issue and thus increase their own expectation of self-efficacy and at

the same time generate positive peer pressure [28]. At the end of the classroom seminar, students should give their conclusive opinion on the knowledge they have acquired and on smoking in order to once again create positive peer pressure and influence the subjective norm on the basis of the theory of planned behaviour. For repetition of what has been learned, posters are hung up and letters are distributed to parents and students, which again encourage the use of the Smokerface app outside the classroom setting.

Smokerface poster campaign

The effectiveness of the poster campaign is currently being evaluated in a randomized controlled trial [44]. 9,851 students from 126 secondary schools participate in the prospective experimental study. The data is collected by questionnaire at the beginning and 6, 12 and 24 months after intervention. The final interview will be supplemented by randomly selected carbon monoxide breath tests for biochemical validation of the results. The intervention schools receive the Smokerface poster campaign, control schools with comparable baseline data receive no intervention. In the baseline survey, the prevalence for cigarette smoking was 4.7%, for e-cigarettes 4.6% (1.6% use both). The primary endpoint is the difference in post-interview smoke prevalence after 24 months in the control group compared to the intervention group. Secondary endpoints measured are changes in smoking habits and the number of students who have started or stopped smoking. The data collection will be completed in August 2018 and the results will be presented and submitted for publication.

International dissemination and generalizability of the programme

Since one study has already demonstrated the different effectiveness of a tobacco prevention programme in different European countries, the EAT curriculum could not have a generalised preventive effect in the face of different socio-cultural backgrounds. [45, 46]. Therefore, parallel to the evaluation in Germany, the mirroring approach and the complete curriculum will be investigated in randomized controlled long-term studies with more than 1,500 included secondary school students in Brazil [13, 47].

Outlook

At the beginning, EAT's activities focused on tobacco prevention at school in Germany. On the basis of the currently still pending results of the ongoing evaluation studies, the programme will be continuously improved in the future according to the most recent findings. A transferability to other socio-cultural backgrounds is also part of current evaluations. The international expansion and implementation of the programme is continually expanding. To improve effectiveness and dissemination, the Smokerface app has been developed, which has now been downloaded over 400,000 times, was translated into the six most spoken languages and is being promoted in poster campaigns for cost-effective, broadly effective prevention. Finally, the tobacco prevention courses were developed to improve the appropriate treatment of smoking patients through medical students. The activities at the tobacco control level are also increasing both nationally and internationally: The Medical Association for Tobacco Prevention is attempting to prevent relationships through political dialogue (e.g. increase in tobacco tax, ban on tobacco advertising) and is steadily gaining members. In future, an expansion of the programme to new target groups such as nursing students will be evaluated in order to further increase behavioural-preventive effects in a new target group with significantly higher smoking prevalence. In this context, a transferability of the mirroring approach with 197 included nursing students was tested in Cologne and Bonn in April 2018 (smoking rate 27.3%). The data are currently still being evaluated. Based on these results, a new curriculum for this age group is to be developed, rolled out and evaluated nationally and internationally.

Conclusion

About 6 years after the foundation of EAT in January 2012, the initiative with over 3,500 medical students, doctors and approximately 50,000 enlightened pupils per year is the greatest school tobacco prevention measure we are aware of from (prospective) doctors worldwide. The students are currently volunteering at over 80 medical faculties in 14 countries. The concept of the prevention programme has been promising in initial studies and is currently being evaluated in a randomized controlled trial on a large scale. The apps developed by EAT are free and available in the six most commonly spoken languages worldwide. By improving medical education, future clinicians should be able to competently advise their patients on smoking cessation. The future physicians, who

are sensitized to the issue of smoking, can continue to participate within the framework of the Medical Association for Tobacco Prevention and the EAT groups also form their first own tobacco control initiatives internationally, such as the Brazilian Award for Tobacco Control. For instance, the initiative has developed from prevention work on individual young people beyond the school level and national borders into a network that operates at political and global level and launches measures of great importance for public health.

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