

# A Structured Intervention for Medical Students Significantly Improves Awareness of Stigmatisation in Visible Chronic Skin Diseases: A Randomised Controlled Trial

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**People with visible skin diseases often experience stigmatisation. The aim of this study was to develop and evaluate a new intervention for medical students to counter the stigmatisation of people with skin diseases. The intervention was evaluated using a randomised controlled design. Effectiveness was assessed at 3 time points. Data from 127 participants were analysed. Regarding the outcome "social distance", a significant difference between the measurement points was observed for the intervention group ( $\chi^2(2) = 54.32$ ,  $p < 0.001$ ), which also showed a significant effect on agreement with negative stereotypes ( $F(1.67, 118.67) = 23.83$ ,  $p < 0.001$ , partial  $\eta^2 = 0.25$ ). Regarding the outcome "agreement with disease-related misconceptions", a significant difference between the measurement time points was observed for the intervention group ( $\chi^2(2) = 46.33$ ,  $p < 0.001$ ); similar results were found for the outcome "stigmatising behaviour" ( $F(1.86, 131.89) = 6.16$ ,  $p = 0.003$ , partial  $\eta^2 = 0.08$ ). The results should encourage medical faculties to invest in such courses in order to prevent stigmatisation of people with skin diseases.**

**Key words:** stigmatisation; visible skin diseases; intervention; randomised controlled trial.

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Approximately 10 million people in Germany experience chronic skin diseases, such as psoriasis, atopic dermatitis, or vitiligo (1). Patients' health-related quality of life (HRQoL) is not only negatively affected by physical symptoms and comorbidity, but also by psychosocial factors. Several studies have demonstrated high levels of anger, impaired self-esteem, and symptoms of depression, such as loss of interest and anxiety, in patients (2–4). In addition to the above-mentioned intrapersonal burden of chronic diseases, there is also a specific in-

## SIGNIFICANCE

People with visible skin diseases often experience stigmatisation. The aim of this study was to develop and evaluate an intervention for medical students to counter the stigmatisation of people with skin diseases. A 3-h intervention was developed, including self-experience, education and a patient encounter. Effectiveness regarding outcomes was assessed at 3 time points: before and immediately after the intervention, and at 3-month follow-up. Data from 127 participants were analysed. Regarding all outcomes, significant effects were observed in the intervention group, for "social distance", "agreement with negative stereotypes", "agreement with disease-related misconceptions" and "intended behaviour". These results should encourage medical faculties to invest in such courses to prevent stigmatisation.

terpersonal experience of stigmatisation. In Germany, many sources report that, even today, stigmatisation remains highly prevalent and burdensome for people with skin diseases (5). This multi-faceted construct can be divided into public/external stigmatisation and self-stigmatisation (6).

Research indicates that people affected by skin diseases experience both external stigmatisation (5, 7) and self-stigmatisation (8–10). Studies have shown a considerable psychosocial effect, with a major impact on social life, altering interpersonal relationships, and resulting in feelings of social alienation and rejection (11, 12). Several clinical, sociodemographic, and psychosocial variables have been found to be associated with stigmatisation (13). Regarding health outcomes, research indicates that perceptions of stigmatisation also play an important role in predicting HRQoL, depression, and anxiety (13–15), emphasising the urgency of the development and implementation of actions to counter stigmatisation (16).

Therefore, a holistic view and a people-centred perspective are needed to adequately address the physical, psychological, and social impairments associated with a dermatological disease. In 2014, the World Health Assembly (WHA) stressed the importance of a holistic

approach to healthcare, including efforts against stigmatisation of patients with psoriasis. The WHA called on its member states to take measures to “fight stigma” and improve healthcare for affected people. The international recognition of stigma-related impairments and a patient-centred approach are also required for other visible chronic skin diseases (7). A recent systematic literature review concluded that to account for stigma-related impairments, evidence-based interventions and their evaluation for effectiveness and feasibility are urgently needed (16). Furthermore, addressing such interventions to healthcare professionals, as a potentially stigmatising group, may emphasise the fact that treatment of patients with skin diseases should focus on more than only the treatment of physical symptoms (16). The aim of this project was to develop and evaluate intervention formats for the destigmatisation of people with chronic visible skin diseases in Germany (17). Stigmatisation with regard to mental and somatic conditions was shown to be prevalent among healthcare professionals, which may result in lower access to diagnosis and treatment (8, 18–20). In addition, preparatory research (a systematic literature review (16) and interviews with people affected, their relatives, and healthcare professionals) has shown that negative situations and rejection in the medical context are often perceived (8). The behaviour of healthcare professionals during consultation may thus foster patients’ perception of being stigmatised and increase their psychosocial burden. Therefore, the newly developed intervention addressed medical students, as they will be important in their future professional roles in being responsible for, or reducing stigmatisation. The hypothesis was that a structured 3-h intervention, including elements of: self-reflection, education, and encounter with an affected patient, would lead to a significant improvement in attitudes and beliefs about stigmatisation. In particular, by meeting an individual with personal experience of stigmatisation due to skin disease, the participants should be enabled to recognise typical situations of stigmatisation in the medical context, which would help them to prevent such situations occurring in their future careers (16). Specifically, this project aimed to answer the following research questions: 1) How effective is a new comprehensive intervention for medical students in reducing stigmatising attitudes and intended behaviour against people with skin diseases? and 2) What is the feasibility and acceptance of such an intervention?

## MATERIALS AND METHODS

### *Development and pilot-test of the intervention*

To develop the intervention, population-based surveys were used to determine the knowledge, attitudes towards psoriasis, and the extent and determinants of stigmatisation of people with psoriasis in the German population (external stigma) among an expert group

of patients, dermatologists, psychologists, and other scientists (5). These surveys allowed conclusions to be drawn about awareness of psoriasis and public measures, and opinions about psoriasis and stigmatising attitudes in the German population.

To develop effective measures against stigmatisation, the underlying processes must be analysed from the perspective of all parties involved, both the stigmatised and potentially stigmatising. For this purpose, the experience of stigmatisation and experiences with stigmatisation (external and self-stigmatisation) were recorded from the perspective of people affected by psoriasis, their relatives, and medical providers, by conducting interviews and focus groups, which were then evaluated using content analysis (8). In addition, 2 systematic literature reviews were reviewed. The first review focused on all internationally published interventions for the reduction of stigmatisation in visible skin diseases, which were evaluated with regards to *a priori* defined aspects, such as effectiveness and transferability in German populations (16). Meanwhile, the second review aimed to evaluate all measurements to assess stigmatisation towards skin diseases.

The intervention was subsequently developed according to the following criteria: scientific evidence based on the previously mentioned studies; if unavailable, broad expert consensus on potential benefits, target group, and intervention characteristics; relevance and representativeness of the selected target groups; feasibility and transferability of the intervention; and expected broad effect.

A pilot test regarding feasibility was conducted in December 2018 at the University Medical Center Hamburg-Eppendorf (UKE). A total of 20 medical students participated in the intervention and completed the questionnaires immediately before and after the intervention, for evaluation purposes.

### *Study design and participants*

The evaluation followed a randomised controlled design, as randomisation is the most robust method that prevents selection bias. Eligible participants were all medical students enrolled at the UKE or Kiel. Medical students were recruited through distributed information flyers and online announcements and were allocated to the intervention or control group through an *a priori* compiled randomisation list. Information stated on the flyer/announcement contained contact details (name of the lead researcher, e-mail, and telephone number), time/date, duration of intervention, expense allowance, that participation is voluntary, and that this is a seminar on patient-centricity, which took place within a study funded by the German Ministry of Health. Immediately after registration (by e-mail or phone), students were randomly assigned alternately to the intervention or control group. Participants in the control group attended an alternative programme of the same duration, but with inert content irrelevant to stigmatisation. All participants in the control group were offered the opportunity to attend the intervention after the follow-up phase. Prior to participation, all the students signed an informed consent form. After their complete participation (including follow-up), each student received an expense allowance of 30 Euros. To evaluate the feasibility and effectiveness of the intervention with regards to primary and secondary outcomes, data were collected at 3 time points: baseline/before intervention (t0), immediately after intervention (t1), and at 3-month follow-up (t2). The trial was conducted between May 2019 and February 2020. The results of a previously conducted pilot study were used to estimate the effects of the lack of intervention studies addressing stigma in this field. An *a priori* power analysis was conducted using G\*Power. With an alpha level of 0.05, minimum power established at 0.90, and a moderate expected effect size of 0.65, 102 participants were necessary to find a statistically significant effect in the model.

This study was approved by the ethics committee of the Christian-Albrechts-University Kiel, Germany (AZ: D521–18).

### Intervention

The core concept was based on a previously tested intervention against stigmatisation in mental conditions using the “dialogue approach” (21). This approach describes a process in which patients, their relatives, and healthcare providers engage as equal partners. In the current intervention, the focus was on the encounter between stigmatised (patients) and potentially stigmatising people (medical students). In addition, healthcare professionals (dermatologists/psychologists) participated in the intervention, as moderators of the exchange between participants and a patient, and were readily available to answer medical or psychological questions. Specifically, the dermatologist held the theoretical part, and the psychologist moderated the exercises. Both had taken part in its development and, as such, were familiar with the structure and content of the seminar. The 3-h intervention consisted of 4 components: (i) introduction and self-reflection about encounters of stigmatisation in general, personal “flaw” for which they might be stigmatised and stigmatisation risk in 24 different dermatological diseases (45 min); (ii) lecture held by a dermatologist about examples from clinical practice, theory of physical individualisation, cumulative life course impairment, and stigmatisation (30 min); (iii) the main component was the encounter between a person with psoriasis and the medical students, in which the person affected shared his/her personal history, emphasising his/her experiences with stigmatisation in and outside the health sector and answering questions (90 min); (iv) an invitation for an open discussion and feedback regarding possible lessons learnt from the intervention (15 min).

The participants in the control group were asked to read 2 dermatology-related publications, watch a video lecture about nutrition science, and answer related questions. They received the same set of questions on stigmatisation as the participants in the intervention group.

### Primary outcomes measures

The main outcome was stigmatising attitudes, which were assessed based on the desire for social distance, agreement with skin disease-related misconceptions (psoriasis myths), agreement with skin disease-related stereotypes (each translated into German from Pearl et al. (22)), and reported and intended behaviour towards people with skin disease (Reported and Intended Behaviour Scale (RIBS); adapted from Evans-Lacko et al. (23)). In addition, socio-demographic information, such as age and gender, was recorded. The scales assessing the main outcomes are described below.

**Stereotype endorsement (22).** A scale consisting of 11 adjective pairs (e.g., dirty – clean) was used to assess self-reported stereotype endorsement. Participants were asked to mark the circle closest to the adjective that they considered to describe a person with psoriasis (ranging from 1 to 5). Scores were averaged, with higher scores indicating greater endorsement of negative stereotypes. In the current sample, acceptable internal consistency was observed ( $\alpha=0.75$ ).

**Social distance (22).** This measure assessed the desire for 9 different social situations (e.g., shaking hands) in self-report. Items were rated on a 5-point Likert scale, ranging from “definitely” to “definitely not”. Item scores were averaged, with post-holower scores indicating a lower desire for social distance. Good internal consistency was observed in the current sample ( $\alpha=0.85$ ).

**Disease-related misconceptions (22).** Agreement with common misconceptions about the disease was analysed using 15 statements about psoriasis in self-report (e.g., psoriasis is contagious). Participants rated the statements on a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree”. Scores were averaged, with lower scores indicating lower endorsement of misconceptions. In the current sample, acceptable internal consistency was observed ( $\alpha=0.78$ ).

**Reported and Intended Behaviour Scale (RIBS) (23).** This scale was adapted for use in skin diseases to explore stigmatising behaviour in the current study. Four items of the RIBS assessed in self-report the prevalence of behaviour in each of the 4 contexts: living with, working with, living nearby, and continuing a relationship with someone affected by skin disease; 4 more items assessed intended/stigmatising behaviour within the same contexts. The items assessing the prevalence of behaviour followed a dichotomous response format (yes/no), while items assessing intended/stigmatising behaviour were scored on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”. The total score of intended/stigmatising behaviour was the sum of the response values, with higher scores indicating less stigmatising behaviour. In the current sample, acceptable internal consistency was observed ( $\alpha=0.76$ ).

### Secondary outcome measures

Participants reported sociodemographic data such as age and gender, as well as how often they had contact with individuals affected by skin diseases in their daily lives and whether they were affected by a skin disease themselves at the beginning of the survey (**Table 1**).

### Patient Health Questionnaire (PHQ 9)

The depression module of the PHQ is a self-report measure based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) diagnostic criteria for Major Depression (MDD) and is considered a valid and reliable instrument assessing depressive symptoms (24). Participants were asked to report for 9 depressive symptoms, respectively, if and how often they had bothered them in the previous 2 weeks. The total score, a measure of depression severity, ranges from 0 to 27, with scores of 5, 10, 15, and more indicating mild, moderate, and moderate to severe symptoms of depression. In the current sample, acceptable internal consistency was observed ( $\alpha=0.72$ ).

### Satisfaction with the seminar

A short self-developed questionnaire was used at data collection points  $t_1$  and  $t_2$  to measure the participants’ satisfaction with the intervention group. The 12 items were selected to ascertain students’ satisfaction with the length and content of the seminar, personal estimation of its relevancy in their (working) life, and whether they would recommend the seminar to other students. Participants rated the statements on a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree”. Scores were averaged, with higher scores indicating higher satisfaction. Good internal consistency was observed in the current sample ( $\alpha=0.88$ ).

### Statistical analyses

Unless instructed otherwise in the scoring manuals, missing data that were random and less than 10% of the values were replaced with the individual mean score for each variable. Descriptive statistics (mean  $\pm$  standard deviations (SD)) were obtained for sociodemographic data, depressive symptoms, personal affliction with a skin disease, contact with people affected, and stigmatising attitudes. T-tests (age, academic year, depressive symptoms, stereotype endorsement, and stigmatising behaviour), Mann-Whitney *U* tests (gender, patient contact, social distance and disease-related misconceptions), and  $\chi^2$  tests (study location, affected by skin disease) were used to analyse differences between groups in sociodemographic and main outcome variables.

Intervention effects were analysed using mixed repeated-measures analysis of variance (ANOVA), with Bonferroni *post hoc*



**Table I. Descriptive statistics (mean and standard deviation) of sociodemographic data, depressive symptoms, personal affliction with a skin disease, contact with people affected by a skin disease, and stigmatising attitudes at baseline (t<sub>0</sub>)**

	Total (n = 127)	Intervention (n = 72)	Control (n = 55)	Difference
Study location, n (%)				$\chi^2 (1) = 0.11$
Hamburg	92 (72.4)	53 (73.6)	39 (70.9)	
Kiel	35 (27.6)	19 (26.4)	16 (29.1)	
Gender, n (%)				$z = -1.27$
Female	82 (64.6)	44 (61.1)	38 (69.1)	
Male	44 (34.6)	28 (38.9)	16 (29.1)	
Non-binary	1 (0.8)	–	1 (1.8)	
Age, years <sup>a</sup> , mean (SD)	24.07 (3.68)	24.06 (3.96)	24.09 (3.32)	$t (123) = -0.05$
Academic year, mean (SD)	3.56 (1.23)	3.43 (1.16)	3.73 (1.30)	$t (125) = -1.36$
Affected by skin disease <sup>b</sup> , n (%)				$\chi^2 (1) = 0.18$
Yes	30 (23.6)	16 (22.2)	14 (25.5)	
No	97 (76.4)	56 (77.8)	41 (74.5)	
Depressive symptoms <sup>c</sup> , mean (SD)	4.21 (2.87)	4.32 (3.24)	4.07 (2.31)	$t (125) = 0.48$
Scores < 5, n (%)	77 (60.6)	46 (63.9)	31 (56.4)	
Scores > 5, n (%)	50 (39.4)	26 (36.1)	24 (43.6)	
Patient contact <sup>d</sup> , mean (SD)	2.69 (0.86)	2.64 (0.79)	2.76 (0.94)	$z = -0.83$
Stereotype endorsement, mean (SD)	2.81 (0.56)	2.80 (0.53)	2.86 (0.59)	$t (125) = -0.63$
Social distance, mean (SD)	1.73 (0.60)	1.71 (0.48)	1.76 (0.73)	$z = 0.70$
Disease-related misconceptions, mean (SD)	1.34 (0.44)	1.40 (0.46)	1.26 (0.41)	$z = -2.36^*$
Stigmatising behaviour, mean (SD)	18.58 (1.42)	18.41 (1.31)	18.67 (1.57)	$t (125) = -1.01$

<sup>a</sup>n = 3 subjects reported 2019 as their year of birth. <sup>b</sup>Subjects reported if they were personally affected by a skin disease. <sup>c</sup>Scores below 5 indicate a lack of depressive symptoms. <sup>d</sup>Subjects reported how often they had contact with people affected by skin disease in their daily life ranging from 0 = never to 4 = very often. \*p < 0.05.

tests for pairwise comparisons. Due to violation of the assumption of normal distribution in social distance and myth endorsement scores, a Friedman test was used to analyse the differences between study and control group in these outcomes, with Wilcoxon signed-rank tests with Bonferroni correction aiding in *post hoc* analysis. *p*-values were obtained from 2-tailed tests, with *p* < 0.05 indicating statistical significance. Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS v.25.0; IBM Corp., Armonk, NY, USA).

## RESULTS

### Sample characteristics

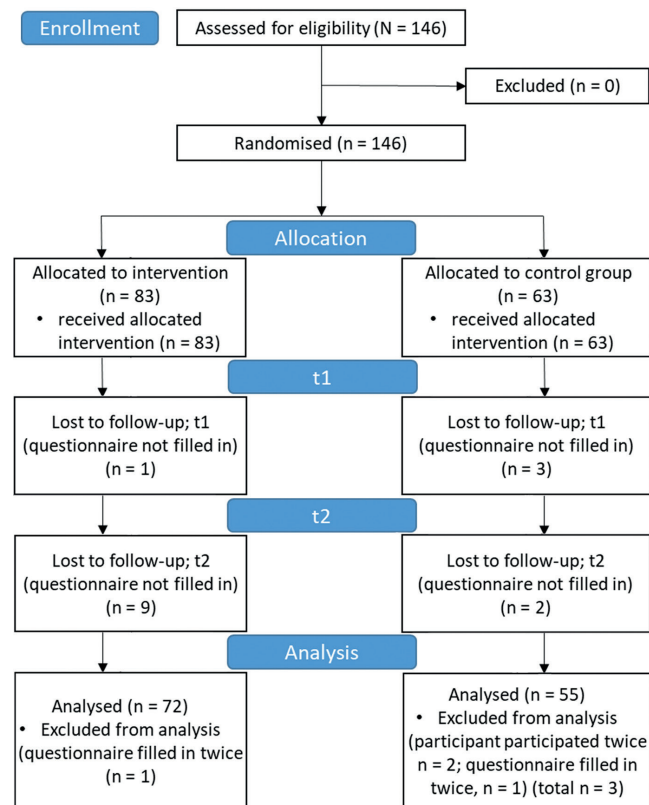
A total of 146 students participated in the evaluation, and complete data from 127 participants were available for all 3 measurement points. Of these, 72 participants were from the intervention group and 55 were from the control group (**Fig. 1**).

Descriptive statistics for the total sample and the intervention and control groups are shown in Table I.

### Primary outcomes

Regarding the outcome “social distance”, the desire for social distance decreased significantly in the participants of the intervention group between the measurement points ( $\chi^2(2) = 54.32, p < 0.001$ ). *Post hoc* analysis was performed using the Wilcoxon signed-rank test with Bonferroni correction and showed a significant reduction in the desire for social distance between t<sub>0</sub> and t<sub>1</sub> ( $Z = 1.04, p < 0.001$ ) and between t<sub>0</sub> and t<sub>2</sub> ( $Z = 0.92, p < 0.001$ ). The reduction in social distance values between t<sub>1</sub> and t<sub>2</sub> was not significant ( $Z = -0.13, p = 1.00$ ). For the control group, the desire for social distance did not significantly decrease between the measurement points ( $\chi^2(2) = 0.80,$

$p = 0.671$ ). Moreover, the 2 study groups differed significantly in their social distance values at t<sub>1</sub> ( $U = 1,567.50, Z = -2.02, p = 0.043$ ). For the measurement points t<sub>0</sub> ( $U = 1,837.50, Z = -0.70, p = 0.487$ ) and t<sub>2</sub> ( $U = 1,714.50, Z = -1.30, p = 0.194$ ) no significant differences were found between the 2 groups (**Table II**).



**Fig. 1. Flow chart participants.**

**Table II. Descriptive statistics (mean and standard deviation) of primary outcomes at t0, t1, and t2**

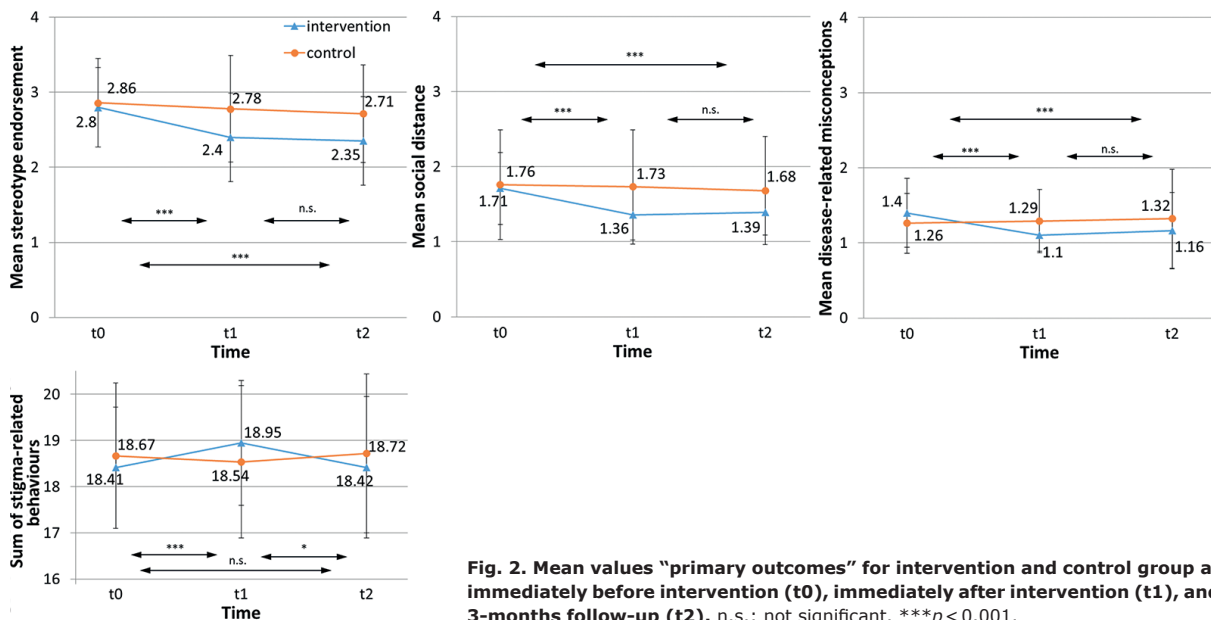
	Intervention (n = 72) Mean (SD)	Difference	Difference	Control (n = 55) Mean (SD)	Difference	Difference
<b>Stereotype endorsement</b>						
t0	2.80 (0.53)	t1-t0	t (71)=5.42; p≤0.001	2.86 (0.59)	t1-t0	t (52)=1.24; p=0.22
t1	2.40 (0.59)	t2-t0	t (71)=5.42; p≤0.001	2.77 (0.72)	t2-t0	t (52)=2.23; p=0.03
t2	2.35 (0.59)	t2-t1	t (71)=0.85; p=0.40	2.71 (0.65)	t2-t1	t (53)=1.22; p=0.23
<b>Social distance</b>						
t0	1.71 (0.48)	t1-t0	z=-6.04; p≤0.001	1.76 (0.73)	t1-t0	z=-0.80; p=0.42
t1	1.36 (0.34)	t2-t0	z=-5.19; p≤0.001	1.73 (0.77)	t2-t0	z=-0.95; p=0.34
t2	1.39 (0.30)	t2-t1	z=-0.98; p=0.33	1.68 (0.72)	t2-t1	z=-0.58; p=0.56
<b>Disease-related misconceptions</b>						
t0	1.40 (0.46)	t1-t0	z=-5.68; p≤0.001	1.26 (0.41)	t1-t0	z=-1.46; p=0.14
t1	1.10 (0.20)	t2-t0	z=-4.83; p≤0.001	1.30 (0.42)	t2-t0	z=-0.75; p=0.46
t2	1.16 (0.51)	t2-t1	z=-1.10; p=0.31	1.32 (0.66)	t2-t1	z=-1.16; p=0.25
<b>Stigmatising behaviour</b>						
t0	18.41 (1.31)	t1-t0	t (71)=-3.60; p=0.001	18.67 (1.57)	t1-t0	t (54)=0.64; p=0.52
t1	18.95 (1.34)	t2-t0	t (71)=-0.05; p=0.96	18.54 (1.65)	t2-t0	t (54)=-0.21; p=0.84
t2	18.42 (1.53)	t2-t1	t (71)=2.84; p=0.01	18.72 (1.72)	t2-t1	t (54)=-0.90; p=0.38

Baseline/before intervention (t0), immediately after intervention (t1), and at 3-month follow-up (t2).

Regarding the outcome “agreement with negative stereotypes”, the agreement with such stereotypes decreased significantly in the participants of the intervention group between t0 and t1 (0.40,  $p < 0.001$ ) and between t2 (0.44,  $p < 0.001$ ). No significant reduction was found between the values of t1 and t2 (0.05,  $p = 1.00$ ; **Fig. 2**). Moreover, a statistically significant effect of time on the agreement with negative stereotypes was observed in the intervention group (Greenhouse-Geisser  $F(1.67, 118.67) = 23.83, p < 0.001$ , partial  $\eta^2 = 0.25$ ), but not in the control group (Greenhouse-Geisser  $F(1.94, 100.70) = 2.67, p = 0.076$ , partial  $\eta^2 = 0.05$ ). There was also a statistically significant interaction between time and the study groups for the outcome “agreement with negative stereotypes” (Greenhouse-Geisser  $F(1.78, 218.48) = 6.12, p = 0.004$ , partial  $\eta^2 = 0.47$ ). In addition, a statistically significant effect was observed in the group ( $F(1, 123) = 8.03, p = 0.005$ , partial  $\eta^2 = 0.06$ ). While the

2 groups initially showed no significant differences in agreement with negative stereotypes at t0 ( $t(123) = -0.63, p = 0.528$ ), the values of the control and intervention groups differed significantly at t1 ( $t(124) = -3.30, p = 0.001$ ) and t2 ( $t(125) = -3.33, p = 0.001$ ).

Regarding the outcome “agreement with disease-related misconceptions”, agreement with disease-related misconceptions decreased significantly in the participants of the intervention group between the measurement points ( $\chi^2(2) = 46.33, p < 0.001$ ). *Post hoc* analysis was performed using the Wilcoxon signed-rank test with Bonferroni correction and showed significant reduction for the participants of the intervention group between t0 and t1 ( $Z = 0.85, p < 0.001$ ) and between t0 and t2 ( $Z = 0.72, p < 0.001$ ). The differences in disease-related misconception values between t1 and t2 were not significant ( $Z = -0.13, p = 1.00$ ). For the control group, no significant difference in agreement with



**Fig. 2.** Mean values “primary outcomes” for intervention and control group at immediately before intervention (t0), immediately after intervention (t1), and 3-months follow-up (t2). n.s.: not significant. \*\*\* $p < 0.001$ .

disease-related misconceptions between the time points was observed for this outcome ( $\chi^2(2)=1.82, p=0.403$ ). Furthermore, the 2 study groups differed significantly in their values of disease-related false assumptions at t0 ( $U=1,510.50, Z=-2.36, p=0.018$ ), t1 ( $U=1,417.00, Z=-3.08, p=0.002$ ), and t2 ( $U=1,488.00, Z=-2.70, p=0.007$ ; Fig. 2).

Regarding the outcome “intended/stigmatising behaviour towards people with skin diseases” according to the Bonferroni correction, significant change in stigmatising behaviour could be observed in the participants of the intervention group between t0 and t1 ( $-0.54, p=0.002$ ) and between t1 and t2 ( $0.53, p=0.018$ ). No significant differences were found between the values of t0 and t2 ( $0.01, p=1.00$ ; Fig. 2).

In addition, a statistically significant interaction effect between time and the study groups was observed (Greenhouse-Geisser  $F(1.88, 234.95)=4.17, p=0.019$ , partial  $\eta^2=0.32$ ). In the control group, no statistically significant effect of time on stigma-relevant behaviour was shown (Greenhouse-Geisser  $F(1.84, 99.25)=0.36, p=0.678$ , partial  $\eta^2=0.01$ ), but in the intervention group (Greenhouse-Geisser  $F(1.86, 131.89)=6.16, p=0.003$ , partial  $\eta^2=0.08$ ).

In addition, no statistically significant effect of the group was observed for this outcome ( $F(1, 125)=8.03, p=0.821$ , partial  $\eta^2=0.06$ ). At no time [t0 ( $t(125)=-1.01, p=0.315$ ), t1 ( $t(125)=1.54, p=0.126$ ), and t2 ( $t(125)=-1.04, p=0.300$ )] did the 2 groups show significant differences in their values compared with the stigma-relevant behaviour.

### Secondary outcomes

Furthermore, participants in the intervention group reported significantly higher satisfaction with the event they attended than the participants in the control group, both immediately after the intervention ( $t(137)=9.88, p<0.001$ ) and at 3-month follow-up ( $t(125)=7.71, p<0.001$ ).

## DISCUSSION

Despite extensive evidence on stigmatisation being a severe problem for people with visible chronic skin conditions (5, 25) and a consecutive call for action by the World Health Organisation (WHO) in 2014 (26), very few interventions against stigmatisation have been investigated in controlled trials (16). To the best of our knowledge, none of these has been developed for healthcare professionals, including medical students. The current project, related to the WHO programme and supported by the German Ministry of Health, tended to develop short interventions against stigmatisation based on direct encounters between potentially stigmatising people and people being stigmatised. One such interven-

tion was specifically designed for medical students and tested in the current randomised controlled trial.

The main result of this study is a significant reduction in stigmatising attitudes among medical students because of the new intervention. Specifically, students in the intervention group showed less desire for social distance from people with psoriasis, lower agreement with negative stereotypes and with disease-related false assumptions, and temporarily changed stigmatising behaviour towards people with skin diseases compared with the control group. The findings are mainly consistent with the results of previously conducted interventions in chronic visible skin diseases, showing that interventions establishing contact between patients and the public-reported positive results (27, 28). Similarly, positive results were also found for information-based approaches and those based on contact with affected groups to foster patient participation (29). However, previous stigma interventions mainly targeted patients with Hansen's disease and were conducted in low- and middle-income countries.

It should be noted that, in line with the intervention, which focused on contact with a patient with psoriasis, the scales used were also specifically geared to the clinical picture of psoriasis. To explore whether the intervention had an impact on participants across dermatological conditions beyond psoriasis, further evaluations should be conducted.

The current results show great similarity to the field of mental health. Corrigan and colleagues reported a higher effectiveness of direct contact in changing stigmatising attitudes and behaviours in adults, compared with educational approaches (30). A recently published anti-stigma training programme for medical students showed significantly less stigmatising attitudes towards people with mental illness in students who received the training (21). However, another study reported that stigmatising attitudes were the most prevalent among the most experienced medical students. The latter emphasises the need for such specific interventions for medical students, as medical education itself does not guarantee reduction in stigma-related attitudes (31). Thus, implementation programmes are needed to facilitate the application of the new intervention into regular curricula at medical faculties. While face-to-face interventions for reducing external stigma in skin diseases have now been developed and positively evaluated, evidence-based interventions on self-stigma in skin diseases are still lacking. In particular, short interventions that are feasible for routine care are missing. Filling the gap of missing interventions against self-stigma is crucial because it plays a central role in non-communicable visible skin diseases.

The key strength of the present study was that the evaluation followed a randomised controlled design, as randomisation is the most robust method preventing selection bias (32). Nevertheless, the evaluation did not



take place in an obligatory course; instead the participation was voluntary. This may have led to a certain selection bias, since students who are more open to topics such as psychosocial burden/stigmatisation may have participated in the trial, minimising the external validity of our results. However, given the randomised design of the intervention, such selection would not have affected the internal validity of the intervention. In contrast, a major limitation is that complete blinding cannot be guaranteed, as some students could certainly infer which group they were in. Furthermore, based on the scales assessed, it is likely that students from the intervention group understood that the aim was to reduce stigmatisation in people with skin diseases, which might result in a higher social desirability in their response behaviour than those in the control group. In addition, lack of knowledge is often discussed as a main issue in public stigmatisation. It can be assumed that medical students have already extended their dermatological knowledge, which might impact their attitudes. However, as eligible participants were all medical students from 2 medical faculties in Germany, independent of their study year, it might be that some participants had no specific knowledge of dermatological diseases, and some had more knowledge/expertise than others. Nevertheless, this refers to the participants in the intervention and control groups, and thus, avoids respective biases in 1 of the groups.

Another limitation of the current study is the short follow-up period of 3 months due to the limited overall study period. Future research should consider a long-term follow-up of at least 6 months as the minimum time necessary to assess whether improvement remains over time or whether short-term changes persist. Finally, the 3-h duration of the intervention is challenging in terms of allowing implementation in the regular curriculum.

In conclusion, the findings of this study show that the new intervention with a focus on the encounter with a person affected by chronic skin diseases is effective at decreasing stigmatising attitudes in future physicians. Although long-term effects and effects regarding other visible dermatological diseases need to be examined in further research, this study should encourage medical faculties to invest in such courses in order to prevent stigmatisation and, ultimately, to improve the quality of life of people affected by visible skin diseases.

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