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Influence of an Educational Intervention on Medical Students` Attitudes Toward People with Substance Use Disorders A mixed-method study

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Abstract

Background

Individuals with substance use disorders (SUDs) are demonstrably confronted with stigmatization in various areas of life, including the health care system. As a result, this patient group is at risk of receiving less effective medical care. Educational interventions targeting healthcare professionals have been shown to positively influence stigmatizing attitudes and behaviours, yet such programs are not systematically integrated into the medical curricula in German-speaking countries.

Methods

A mixed-methods pre-post study with a control group was conducted among second- to fourth-year medical students at the University of Zurich in spring 2025. The intervention group (n = 13) attended a seven-session elective course on addiction medicine, covering medical, ethical, and social aspects of substance-related disorders, including direct patient interactions. The control group (n = 19) participated in a general practitioner medicine elective course. Students completed a 42-item web-based survey assessing sociodemographics, SUD-related experiences, and attitudes toward individuals with SUDs across four domains: social distance, structural discrimination, guilt, and dangerousness. Quantitative analyses compared pre- and post-intervention responses within and between groups. Qualitative data from open-ended survey responses and a final discussion were analysed thematically.

Results

Quantitative analyses revealed no statistically significant changes in attitudes post-intervention, with baseline attitudes generally balanced and minimally stigmatizing, suggesting a ceiling effect. Minor trends were observed toward greater willingness to treat individuals with SUDs and reduced perceived dangerousness. Qualitative findings identified five overarching themes: knowledge gain on addiction and treatment, broadened understanding of addiction, ethical awareness and destigmatization, scientific reflection, and personal and professional development. Students highlighted direct patient contact and interactive discussions as critical for fostering empathy and reflection.

Conclusions

Despite the lack of a statistically significant effect, descriptive data and student evaluations suggest that the elective course effectively supported core learning objectives. Integrating structured education on addiction medicine into medical curricula may support empathetic, patient-centred care and help address stigma toward individuals with SUDs in clinical practice.

Trial registration:

Not applicable.

Background

Substance use disorders (SUDs) represent a major public health threat. They are associated with significant health risks, including an increased likelihood of developing chronic physical and mental health disorders (1–6). Recent epidemiological data indicates that the mortality rate related to SUDs was 17.19 deaths per 1,000,000 individuals in 2021, with projections suggesting a continued upward trend in the coming years (1). In 2016, drug use as a risk factor accounted for 1.3% of all global disability-adjusted life years (DALYs), corresponding to 31.8 million DALYs. Drug use is among the ten most common contributors to the loss of Quality-Adjusted Life Years (QALYs) in Western countries and thus has a significant economic impact (7).

Switzerland exhibits a high level of consumption of both legal and illegal substances. Compared with other European countries and previous national surveys, substance use tends to begin at an earlier age and has increased among young people in recent years (8). The economic costs of addiction in Switzerland are estimated to account for approximately 1.1% of the gross domestic product (GDP), with alcohol and nicotine representing the largest proportion of these costs (9).

SUDs are highly complex and heterogenous across multiple levels, as interacting social, biological, and individual factors substantially influence their development. Therefore, depending on disorder severity and comorbidities, treatment can be resource-intensive and requires a multifaceted approach. In addition to pharmacological and psychiatric interventions, effective treatment relies on a respectful, empathetic, and motivational therapeutic style (10–12).

Individuals affected by SUDs are very often stigmatized, presenting a worldwide problem (13). Stigmatization frequently occurs within healthcare settings (14). This constitutes a major barrier to treatment, prevents affected individuals from seeking help, and can result in further deterioration of their mental and physical health (15–17).

Studies have shown that the attitudes of healthcare professionals toward individuals with SUDs can be improved through enhanced education and interventions targeting direct interaction with affected individuals. For example, in the United States of America Chung et al. implemented a hybrid workshop (online lecture and discussion) during one month on opioid use disorder (OUD) for third-year medical students, who completed pre- and post-intervention

surveys assessing attitudes, stigma, knowledge, and perceived clinical competence. Their findings demonstrated significant improvements in students` knowledge and a reduction in stigmatizing attitudes, alongside high overall satisfaction with the course (18).

Thus, there exists a situation in which, on the one hand, addiction disorders have a significant impact on healthcare and the associated economic costs, while it is also known that this patient group is generally – and within healthcare settings in particular – stigmatized and often does not receive equitable care.

Education in addiction medicine is not standardized in most countries. A notable exception is United Kingdom. Between 2005 and 2011, under the leadership of the International Centre for Drug Policy, a national strategy was developed there (19). In Switzerland, the need for a structured curriculum modelled on the British example has been articulated, as each of the five universities currently has an individual concept, with a total number of hours ranging from 14 to 52 hours over the entire course of study. There are no publications related to this educational intervention, particularly in the context of stigma (20).

This study therefore aimed to investigate the extent to which an elective educational intervention on addiction medicine during one semester influenced medical students` attitudes toward individuals affected by SUDs.

Methods

Aim, Design and Setting of the Study

The objective of this study was to evaluate potential changes in students

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curriculum.

Participants

Participants in this study were second- to fourth-year medical students studying at the University of Zurich. As part of their curriculum, students were required to attend one elective course during the semester, which they selected according to their interests. Course allocation followed a priority-based system to balance distribution across available courses. Inclusion criteria were participation in the elective course “addiction medicine” or “general practitioner medicine”. All participants gave their written consent to participation. There were no specific exclusion criteria.

Study Design

Educational Intervention

The elective course “addiction medicine” took place seven times between March 4 and May 13, 2025, with each session lasting 180 minutes. A comprehensive overview of the pathophysiology of addiction incorporating medical, ethical, historical, and political perspectives was provided. The intervention specifically focused on substance-related addiction, explaining the most relevant substances along with their mechanisms of action, addictive potential, associated risks, and adverse effects, including both physical and psychological consequences of addiction. Covered substances included alcohol, nicotine, anabolic steroids, cannabis, benzodiazepines, opioids, and cocaine. One session was an excursion to different outpatient addiction treatment centres. The primary objective of the intervention was to enhance the students` understanding of how to approach and treat patients with SUDs while also introducing strategies for prevention, screening, treatment, and ongoing support. The students were given the opportunity to engage directly with individuals affected by SUDs in five of the seven sessions, fostering a deeper, patient-centred perspective on addiction care. The teaching style was interactive and offered room for discussion.

A control group was recruited from the elective course “general practitioner medicine” that also took place at the same time. The course provided insights into general practitioner medicine, various practice models, and their organizational structures in Switzerland. As part of the intervention, each participant visited a medical practice in the Canton of Zurich for one day and gained a better understanding of the doctor`s daily routines and the patients they treat. Addiction medicine was not the primary

focus of the control group`s intervention.

All the participants in the intervention group and the control group were informed about the research project at the beginning of the first session. The questionnaire was completed during the first session and at the end of the last session. The final session in the intervention group concluded with a comprehensive feedback round.

Survey

General Part

The questionnaire was created using REDCap® software. By scanning a QR-Code, participants accessed the survey. Prior to distributing the survey, it was reviewed by a group of fourth-year medical students (n = 10) who were not involved in the study. This pre-test aimed to ensure the clarity of the questions and to estimate the approximate time required for the completion of the survey. The questionnaire took approximately 10 minutes to complete.

The survey comprised a total of 42 items, which can be divided into four parts: sociodemographic data (including age, gender, parental education, personal political orientation, and substance use), SUD-related background characteristics (interest in SUDs, knowing someone being affected by SUDs), quantitative assessment of students` attitudes toward individuals affected by SUDs (see Table 1), and a qualitative part. For the complete questionnaire, see the appendix.

At the beginning of the survey, the aim of the study was explained and the students` informed consent was obtained. It was explicitly stated that the questionnaire pertained solely to SUDs associated with the use of illegal substances, such as cocaine, heroin, or ecstasy and others.

Quantitative Part

Students` attitudes toward individuals affected by SUDs were surveyed by using a set of 11 items adapted from established stigma research. The items were designed to capture key dimensions of public stigma: need for social distance, structural discrimination, guilt, and dangerousness (Table 1) (21–23). All participants were asked to rate their agreement with each statement on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, 5 = strongly agree).

Table 1
Statements by category from the survey.

Category	Statements
Need for social distance	1. I would have a problem with a person with SUD marrying into my family.
	2. I would tolerate a person with SUD in my circle of friends.
	3. I would date a person with SUD.
Structural discrimination	4. Employers should have the option of refusing to hire a person with SUD.
	5. Health insurance companies should cover the same level of benefits for people with SUDs as for people with other illnesses (e.g., hypertension, diabetes).
	6. It is less worthwhile investing time in people with SUDs, as their medical problems often cannot be resolved.
	7. I would personally treat a person with SUD.
Guilt	8. People with SUDs are irresponsible and lazy.
	9. People with SUDs have chosen their lifestyle and could change it if they wanted to.
Dangerousness	10. People with SUDs are more dangerous than healthy people.
	11. People with SUDs are less trustworthy.

Qualitative Part
Participants in the intervention group were asked to reflect on what they gained from the elective course by answering an open-ended question at the end of the survey. Moreover, the final session in the intervention group concluded with a comprehensive 45-minute feedback round, where every participant was asked to share their most relevant experience during the intervention. The feedbacks were sorted into overarching themes.

Statistical Methods

Student characteristics and measurements were described as numbers and percentages, n (%), for categorial or binary variables and as mean (standard deviation (SD)) or median [interquartile range (IQR)], as appropriate, for continuous variables. No-missing responses were reported. For group comparisons, chi-squared or Fisher`s exact tests were used for categorial or binary variables, and t-test or Mann-Whitney/Kruskal-Wallis tests for continuous variables, as appropriate. A $p \leq 0.05$ was used to determine statistical significance. Statistical analysis was performed using the R software (version 4.5.0) (24).

Use of large language models

ChatGPT (OpenAI, version GPT-5) was used for language refinement and stylistic improvements of the manuscript. All content, interpretations, and conclusions are the exclusive contributions of the authors.

Results

Participants

Initially, 42 participants completed the pre-intervention survey (n = 17 intervention group, n = 25 control group). Of these, 32 also completed the post-intervention survey (n = 13 intervention group, n = 19 control group) and constitute the sample for the pre-post analyses (see table 2). The sociodemographic characteristics reported below therefore refer to these 32 participants. Of the initial 42 participants, 10 participants (4 participants in the intervention group and 6 participants in the control group) did not complete the post-intervention survey and can be referred to as dropouts. The demographic composition of the dropouts did not differ systematically from that of the complete sample.

In both groups, a majority was female and politically affiliated with the centre to left spectrum. Most participants reported that their parents held an academic degree, typically at university or doctoral level. The only statistically significant difference between the groups was a higher interest in addiction medicine among participants in the intervention group. Although statistically not significant, participants in the intervention group were also more likely to report knowing at least one person affected by SUD and tended to report more consumption of alcohol and nicotine.

Regular use of cannabis, or analgesics was less common in both groups. None of the participants reported monthly use of cocaine, opioids, benzodiazepines, ketamine, LSD, MDMA, anabolic steroids, or similar substances.

Table 2 Sociodemographic data of the participants and SUD-related background characteristics.

		Intervention group	Control group	p-value
Participants (n)		13	19	
Age (median [IQR])		23.00 [22.00, 25.00]	23.00 [22.00, 23.50]	0.367
Gender (%)	Female	7 (53.8)	14 (73.7)	0.435
Highest education level of parents (%)	Vocational school	2 (15.4)	0 (0.0)	0.277
	University of applied sciences	1 (7.7)	2 (10.5)	
	High school	0 (0.0)	1 (5.3)	
	Habilitation (Professor)	1 (7.7)	0 (0.0)	
	Compulsory school (primary-/middle-/high-school)	1 (7.7)	0 (0.0)	
	Doctorate	3 (23.1)	4 (21.1)	
	University	5 (38.5)	12 (63.2)	
Political affiliation (%)	SP	2 (15.4)	7 (36.8)	0.507
	Green/liberal	3 (23.1)	5 (26.3)	
	FDP	2 (15.4)	1 (5.3)	
	Middle	3 (23.1)	1 (5.3)	
	SVP	0 (0.0)	0 (0.0)	
	Others	1 (7.7)	1 (5.3)	
	No political interest	2 (15.4)	4 (21.1)	
Interest in addiction medicine (%)	Yes	12 (92.3)	10 (52.6)	0.047
	No	1 (7.7)	9 (47.4)	
Knowing at least one person with an addiction problem	Yes	11 (84.6)	11 (57.9)	0.225
	No	2 (15.4)	8 (42.1)	
Alcohol consumption ≥ 1x/month (%)	Yes	11 (84.6)	13 (68.4)	0.533
	No	2 (15.4)	6 (31.6)	
Tobacco consumption ≥ 1x/month (%)	Yes	4 (30.8)	1 (5.3)	0.145
	No	9 (69.2)	18 (94.7)	
Cannabis consumption ≥ 1x/month (%)	Yes	1 (7.7)	1 (5.3)	1.000
	No	12 (92.3)	18 (94.7)	
Cocaine consumption ≥ 1x/month (%)	Yes	0 (0.0)	0 (0.0)	-
	No	13 (100.0)	19 (100.0)	
Opioid consumption ≥ 1x/month (%)	Yes	0 (0.0)	0 (0.0)	-
	No	13 (100.0)	19 (100.0)	
Benzodiazepine, pregabalin, GHB (or similar) consumption ≥ 1x/month (%)	Yes	0 (0.0)	0 (0.0)	-
	No	13 (100.0)	19 (100.0)	
Ketamine, nitrous oxide, poppers (or similar) consumption ≥ 1x/month (%)	Yes	0 (0.0)	0 (0.0)	-
	No	13 (100.0)	19 (100.0)	
LSD, psilocybin (or similar) consumption ≥ 1x/month (%)	Yes	0 (0.0)	0 (0.0)	-
	No	13 (100.0)	19 (100.0)	
MDMA, Ritalin (or similar) consumption ≥ 1x/month (%)	Yes	1 (7.7)	0 (0.0)	0.846
	No	12 (92.3)	19 (100.0)	
Anabolic steroids consumption ≥ 1x/month (%)	Yes	0 (0.0)	0 (0.0)	-
	No	13 (100.0)	19 (100.0)	

Analgesics consumption ≥ 1x/month (%)	Yes	0 (0.0)	7 (36.8)	0.041
	No	13 (100.0)	12 (63.8)	

Abbreviations: FDP = Liberal Democratic Party (middle-right), GHB = Gamma-hydroxybutyric acid, LSD = Lysergic acid diethylamide, MDMA = 3,4-Methylenedioxymetamphetamine, SP = Social Democratic Party (left-wing), SVP = Swiss People`s Party (conservative, right-wing)

Quantitative part

Category: Need for social distance

Across all three statements, pre-test responses were primarily concentrated in the middle categories, indicating generally moderate attitudes (for statistical details, see table 3).

For statement 1, views were initially mixed, with equal proportions expressing acceptance and rejection. After the intervention, responses shifted toward moderate acceptance, accompanied by a slight reduction in strong rejection ($p = 0.732$).

Statement 2 showed consistently high tolerance before the intervention, which remained stable afterwards, with only a small movement toward more moderate agreement ($p = 0.957$).

In contrast, statement 3 was rejected by the majority at baseline, which became even more pronounced post-intervention, as rejection increased, and higher levels of agreement nearly disappeared ($p = 0.518$).

Overall, post-intervention results demonstrated a similar pattern to the pre-test, without substantial shifts.

Category: Structural discrimination

Across all four statements in this category, the pre-test results showed generally moderate attitudes (for statistical details, see table 3).

Statement 4 revealed moderate rejection of discriminatory hiring practices at pre-test. The post-test responses did not shift clearly toward either stronger agreement or disagreement. Instead, responses became more polarized, with a small increase in both strong rejection and moderate agreement; however, this change was not statistically significant ($p = 0.413$).

For statement 5, pre-test results indicated very high acceptance of equal insurance coverage for individuals with SUDs. Post-test responses remained highly supportive, with only minimal variation ($p = 0.384$).

Statement 6 showed a pronounced rejection of the statement already at pre-test, with participants exclusively selecting Likert points 1 and 2. This pattern remained unchanged in the post-test ($p = 1$).

For statement 7, pre-test results demonstrated high willingness to personally treat individuals with SUDs. Post-test responses showed a slight additional shift toward more positive attitudes, though the change did not reach statistical significance ($p = 0.159$).

Category: Guilt

Overall, the pre-test results for both statements in this category showed moderate rejection of guilt-related stereotypes, indicating that participants already held relatively low-stigmatizing attitudes at baseline. Only minor pre/post changes were observed (for statistical details, see table 3).

More specifically, statement 8 showed a clear tendency toward rejecting the idea that people with SUDs are irresponsible and lazy, with participants selecting only Likert points 1, 2 and 3 in the pre-test. Post-test responses shifted slightly further toward rejection, although this change was not statistically significant ($p = 0.672$).

Statement 9 demonstrated a moderate tendency toward attributing responsibility to individuals with SUDs in the pre-test, with responses distributed across Likert points 1 to 4. Post-test results showed a small shift toward lower attribution of guilt, but again without statistical significance ($p = 0.716$).

Category: Dangerousness

The two statements in this category showed moderate levels of stigmatizing attitudes in the pre-test (for statistical details, see table 3).

Statement 10 indicated a moderate perception of dangerousness toward people with SUDs at baseline. In the post-test, responses shifted slightly toward stronger rejection of this stereotype ($p = 0.151$).

Statement 11 likewise showed moderate doubt regarding the trustworthiness of individuals with SUDs in the pre-test. Post-test results revealed a small shift toward less stigmatizing views ($p = 0.258$). Overall, both statements showed a slight shift toward more positive attitudes, without achieving statistical significance.

Table 3 Survey results and comparisons between the intervention and control groups and within the groups in the pre and post assessments.

	Within intervention group		p-value	Within Control Group		p-value	Between groups - Pre (1) vs Pre (2)	Between groups - Post (1) vs. Post (2)
	Pre (1) n=17	Post (1) n=13		Pre (2) n=25	Post (2) n=19		p-value	p-value
Need for social distance								
I would have a problem with a person with SUD marrying into my family.			0.424			0.992	0.489	0.801
Strongly disagree / Disagree	6 (35.3)	3 (23.1)		5 (20.0)	4 (21.1)			
Neutral	4 (23.5)	6 (46.2)		9 (36.0)	7 (36.8)			
Agree / Strongly agree	7 (41.2)	4 (30.8)		11 (44.0)	8 (42.1)			
II would tolerate a person with SUD in my circle of friends			1.000			0.394	0.006	0.225
Strongly disagree / Disagree	-	-		6 (24.0)	2 (10.5)			
Neutral	2 (11.8)	2 (15.4)		9 (36.0)	6 (31.6)			
Agree / Strongly agree	15 (88.2)	11 (84.6)		10 (40.0)	11 (57.9)			
I would date a person with SUD			0.419			0.221	0.517	0.697
Strongly disagree / Disagree	12 (70.6)	11 (84.6)		17 (68.0)	17 (89.5)			
Neutral	3 (17.6)	2 (15.4)		7 (28.0)	2 (10.5)			
Agree / Strongly agree	2 (11.8)	0 (0.0)		1 (4.0)	0 (0.0)			
Structural discrimination								
Employers should have the option of refusing to hire a person with SUD.			0.591			0.773	0.990	0.473
Strongly disagree / Disagree	8 (47.1)	4 (30.8)		12 (48.0)	10 (52.6)			
Neutral	6 (35.3)	5 (38.5)		9 (36.0)	5 (26.3)			
Agree / Strongly agree	3 (17.6)	4 (30.8)		4 (16.0)	4 (21.1)			
Health insurance companies should cover the same level of benefits for people with SUDs as for people with other illnesses (e.g., hypertension, diabetes).			0.210			0.689	0.109	0.907
Strongly disagree / Disagree	3 (17.6)	1 (7.7)		1 (4.0)	2 (10.5)			
Neutral	2 (11.8)	5 (38.5)		9 (36.0)	6 (31.6)			
Agree / Strongly agree	12 (70.6)	7 (53.8)		15 (60.0)	11 (57.9)			
It is less worthwhile investing time in people with SUDs, as their medical problems often cannot be resolved.			1.000			0.664	0.143	0.319
Strongly disagree / Disagree	17 (100.0)	13 (100.0)		20 (80.0)	17 (89.5)			
Neutral	-	-		5 (20.0)	2 (10.5)			
Agree / Strongly agree	-	-		-	-			
I would personally treat a person with SUD.			0.354			0.573	0.220	0.745
Strongly disagree / Disagree	1 (5.9)	0 (0.0)		1 (4.0)	0 (0.0)			
Neutral	0 (0.0)	1 (7.7)		4 (16.0)	2 (10.5)			
Agree / Strongly agree	16 (94.1)	12 (92.3)		20 (80.0)	17 (89.5)			
Guilt								
People with SUDs are irresponsible and lazy.			1.000			1.000	0.253	0.166
Strongly disagree / Disagree	16 (94.1)	13 (100.0)		19 (76.0)	15 (78.9)			

Neutral	1 (5.9)	0 (0.0)		6 (24.0)	4 (21.1)		
Agree / Strongly agree	-	-		-	-		
People with SUDs have chosen their lifestyle and could change it if they wanted to			0.507			0.082	0.174	0.341
Strongly disagree / Disagree	14 (82.4)	10 (76.9)		17 (68.0)	15 (78.9)		
Neutral	2 (11.8)	3 (23.1)		8 (32.0)	2 (10.5)		
Agree / Strongly agree	1 (5.9)	0 (0.0)		0 (0.0)	2 (10.5)		
Dangerousness							
People with SUDs are more dangerous than healthy people.			0.238			0.449	0.085	0.429
Strongly disagree / Disagree	8 (47.1)	6 (46.2)		10 (40.0)	8 (42.1)		
Neutral	4 (23.5)	6 (46.2)		13 (52.0)	11 (57.9)		
Agree / Strongly agree	5 (29.4)	1 (7.7)		2 (8.0)	0 (0.0)		
People with SUDs are less trustworthy.			0.087			0.846	0.061	0.733
Strongly disagree / Disagree	8 (47.1)	4 (30.8)		9 (36.0)	8 (42.1)		
Neutral	4 (23.5)	8 (61.5)		14 (56.0)	9 (47.4)		
Agree / Strongly agree	5 (29.4)	1 (7.7)		2 (8.0)	2 (10.5)		

Qualitative Part

Of the 13 participants in the post-intervention survey, 8 provided an answer to the open-ended question. All participants in the intervention group took part very actively in the final feedback round. Participants` responses to the question “What do you take away from the course?” and statements in the feedback round yielded five overarching themes: (1) knowledge gain about addiction treatment, (2) broadened understanding of addiction, (3) ethical awareness and destigmatization, (4) research and scientific reflection, and (5) personal and professional development.

Knowledge gain about addiction and treatment

Participants reported a significant increase in their understanding of addiction medicine. The diversity of psychoactive substances, their pharmacological mechanisms, and evidence-based treatment approaches were highlighted. The inclusion of substitution therapy, as well as discussions of less commonly addressed addictions such as addiction in the context of chemsex, were described as particularly enriching. The presentation of real patient cases was perceived as valuable for linking theoretical knowledge to clinical practice.

Example: “Many new insights into various substances with all their facets.”

Broadened understanding of addiction

Students described a shift from narrow, substance- focused perspective toward a broader, biopsychosocial understanding of addiction. They emphasized that addiction extends beyond chemical substances to include behavioural dependencies and complex contextual factors such as “set and setting”. This broader conceptualization reflected an increased awareness of the multifactorial nature of addiction and its relevance across different medical and psychosocial contexts.

Example: “Difficult topic. Challenges prejudices. A major global problem. It is important to treat these patients. Addiction is encountered in all medical specialities.

Ethical awareness and destigmatization

Responses underscored a change in personal attitudes toward individuals affected by addiction. Students reported that the course challenged their pre-existing biases and encouraged a more empathetic, non-judgmental stance. It was noted that addiction represents a major global health concern that requires compassionate treatment across all medical specialities. The emphasis on stigma reduction and the importance of viewing addiction as medical rather than moral issue were recurrent themes throughout the responses.

Example: “Dissolution of many prejudices, such as the demand for abstinence.”

Research and scientific reflection

Participants expressed awareness of existing research gaps, particularly in relation to the therapeutic management of non-opioid-related addictions. These reflections suggest that the course not only enhanced factual knowledge but also stimulated critical thinking and scientific curiosity regarding underexplored areas in addiction research.

Example: “There are gaps in research, particularly in the therapeutic field of non-opioid-related substance use disorders.”

Personal and professional development

The course was also perceived as an opportunity for personal growth. Students highlighted that interactions with patients and discussions during class helped them to adopt a more open and reflective attitude toward addiction. They mentioned developing greater empathy and confidence in addressing addiction-related issues in future clinical encounters.

Example: “The patient conversations were very personal and helped me become more open in dealing with this topic.”

Discussion

Main findings

In the evaluation of the quantitative data analysis, it can be generally summarized that there were no significant changes between the pre- and post-surveys. Participants already demonstrated balanced and minimally stigmatizing attitudes in the categories of structural discrimination, guilt, and dangerousness before the intervention, which changed only slightly post-intervention. This may partly be due to a ceiling effect. A shift toward less stigmatizing attitudes was most apparent in the categories structural discrimination and dangerousness. Specifically, after the survey, participants were more willing to treat individuals with SUDs (item 7) and perceived them as less dangerous (item 10), which could be causally related.

In the category of desire for social distance, participants showed the most resistant attitudes, which appeared to be slightly accentuated after the intervention. However, this does not seem to limit the overall openness in the professional setting, which should be considered more relevant.

The intervention was rated as highly valuable by the participants. Many participants indicated that the intervention made them aware for the first time that individuals with SUDs experience stigma and that their often complex medical situations are frequently insufficiently addressed.

Overall, the findings indicate that the course facilitated cognitive, ethical, and personal learning outcomes. It promoted both professional competence and reflective capacity, suggesting that addiction education can serve as a transformative component of medical training.

The fact that participants found the intervention highly enriching on the one hand, but that the quantitative analysis did not reveal any notable findings on the other, requires consideration on the personal level of the participants and the methodological level.

Implications in context of existing research

As also reported in other studies in similar contexts, direct patient contact is considered a key factor in prompting reflection on attitudes and presumed knowledge, and in fostering openness (25, 26). Graves et al. showed with their study in the United States of America that even a relatively simple educational intervention – consisting of self-directed learning materials on OUD followed by an interactive presentation by individuals affected by OUD – led to reduced stigmatizing attitudes. In this study, first-year medical students rated their agreement with stigma-related statements on a 5-point Likert scale before and after the intervention, with post-interventional ratings indicating a measurable decrease in stigma (25).

These findings underline that frequent contact with SUDs in clinical settings contributes to a reduction in stigmatizing attitudes and that addressing stigmatization within the healthcare system is crucial to ensure optimal treatment outcomes and to promote the health and well-being of affected patients (14, 27).

Several studies suggest that female and younger individuals tend to show fewer stigmatizing attitudes toward people with SUDs. For example, Abuhammad et al. examined the influence of personal attributes – such as age, gender, educational level, income, and experience with addiction – on stigmatizing attitudes toward individuals with SUDs among 251 undergraduate students enrolled in health majors at the university in northern Jordan in 2017. Their findings indicated a significant correlation between gender and stigma; female and younger students exhibited less stigmatizing attitudes toward individuals affected by SUDs than older male peers (28).

Broader research on mental health stigma shows similar patterns. Corrigan et al. investigated in 2007 how demographic variables influence stigma toward people affected by mental illness or substance abuse and concluded that there is a relationship between gender and stigma. Participants (n = 968) were asked to fill out a survey after reflecting on a vignette about a person affected by a health condition (schizophrenia, drug dependence, or emphysema). Results implicated a tendency that women were less stigmatising and blame less for health conditions than men. Women were also more likely to provide support for people affected by health conditions (29).

However, evidence concerning the association between stigma, gender, and age is not fully consistent. In 2025 Pinxten et al. published a study examining addiction specialists $\text{and } tra \in ees$ (n = 145) attitudes toward patients with SUDs and associations between attitudes, gender, and perceived competence. Participants had to rate stigma statements on a 6-point Likert Scale during or after their training. No significant associations were found between gender and stigmatizing attitudes (30).

Overall, these heterogeneous findings suggest that generalizations about gender- and age-related differences in stigma should be made with caution.

Individual political orientation can also influence stigma levels. DeLuca et al. demonstrated in 2018 that right-wing authoritarianism was significantly linked to higher mental health stigma in an online survey (31). Similarly, Löve et al. found that more conservative political orientation was associated with higher

levels of depression stigma in a population-based Swedish sample (32). These findings suggest that left-leaning political orientations may generally correspond to less stigmatizing attitudes.

Pronounced interest in addiction medicine and prior clinical experience with affected patients can lower baseline stigma as Lew et al. found that third-year medical students showed relatively low baseline levels of stigmatization before participating in an addiction psychiatry consultation-liaison service, thereby limiting the extent of observable post-intervention changes (33). Manganti et al. likewise reported minimal change among undergraduate students participating in an intervention on OUD who already possessed substantial baseline knowledge and prior exposure to affected individuals (34). Furthermore, Cazalis et al., in a recent scoping review, highlighted that personal or professional contact with individuals affected by addiction is generally associated with fewer stigmatizing attitudes among healthcare professionals (16).

Finally, Chung et al. reported more statistically significant results in a similar pre- and post-interventional design focusing on OUD, likely due to a considerably larger intervention group (116 pre-survey and 114 post-survey participants) (18). This underlines the importance of ensuring adequate sample sizes in future studies.

Strengths and limitations

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s impact. While the quantitative analyses did not reveal statistically significant changes in stigmatizing attitudes, the qualitative findings provide important complementary insights into students` cognitive, ethical, and professional development. In particular, the inclusion of open-ended responses and structured feedback discussions enabled the identification of nuanced learning processes – such as increased empathy, reflective capacity, and a broadened understanding of addiction – that would likely remain undetected using standardized measures alone.

Despite these strengths, several limitations need to be considered. Most importantly, the small sample size limits the statistical power of the study and reduces the ability to detect significant changes. This increases the likelihood of type II errors and restricts the generalizability of the findings. The relatively high dropout rate between pre- and post-assessment further reduces the effective sample. The predominantly female, young, and centre-left sample may have contributed to already low baseline stigma levels, resulting in a ceiling effect. However, the findings are unlikely to result from selection bias, as the control group differed from the intervention group only in their interest in addiction medicine – a difference expected due to the voluntary nature of the intervention.

Another limitation relates to the measurement instrument. Although the questionnaire was based on established stigma domains, the use of a relatively small number of items may have limited sensitivity to subtle attitudinal changes. In addition, self-reported attitudes are susceptible to social desirability bias, particularly in the context of stigmatization, which may have led participants to provide more socially acceptable responses, especially at baseline.

Finally, the study assessed only short-term effects immediately after the intervention. It remains unclear whether the observed qualitative learning outcomes translate into sustained attitude changes or actual clinical behaviour in the long term.

Conclusion

The qualitative findings underscore the urgent need to address the educational gap in addiction medicine, as patients with SUDs remain highly underserved.

Stigmatizing attitudes may emerge later in professional life, highlighting the importance of extending educational interventions beyond medical school and evaluating their long-term impact. Systematically integrating addiction medicine education, including patient perspectives, into the curriculum can foster evidence-based knowledge, enhance empathy, and promote patient-centred care.

Abbreviations

DALY: Disability-Adjusted Life Year

FDP: Liberal Democratic Party (Switzerland)

GDP: Gross Domestic Product

GHB: Gamma-hydroxybutyric acid

LSD: Lysergic acid diethylamide

MDMA: 3,4-Methylenedioxymethamphetamine

OUD: Opioid Use Disorder

QALY: Quality-Adjusted Life Year

SP: Social Democratic Party (Switzerland)

SUD: Substance Use Disorder

SVP: Swiss People`s Party (Switzerland)

Declarations

Ethics approval and consent to participate

The survey did not fall within the scope of the Swiss human research act and the local ethics committee of Zurich, Switzerland, waived the need for ethics approval (Article 2 of the Swiss Federal Act on Research involving Human Beings). As established by the Swiss Federal Law (HFG) and by the cantonal ethics committee, informed consent was not applicable because the study used anonymized data irreversibly altered, according also to the European General Data Protection Regulation.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

GLW contributed to conceptualization, methodology, and investigation (all supporting), drafted the original manuscript (lead), and contributed to review and editing.

PB contributed to conceptualization, methodology, and resources (all supporting), provided supporting supervision, and contributed to review and editing.

GS contributed to methodology, resources, and review and editing (all supporting).

OS contributed to methodology, resources, and review and editing (all supporting).

SDG conducted the formal analysis (lead), curated the data (lead), and contributed to drafting the original manuscript (supporting).

GP was responsible for software development (lead).

MH contributed to resources and review and editing (both supporting).

FB led conceptualization, methodology, supervision, and investigation, and contributed to drafting the original manuscript and to review and editing (both supporting).

All authors read and approved the final manuscript.

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- AppendixBquestionnaireenglishversion.pdf