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Effectiveness of Health Belief Model-Based Educational Intervention In Improving Knowledge, Beliefs, Smoking Behaviors, And Nicotine Dependence Among Cigarette Smoking Medical Students During COVID-19 Pandemic

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A B S T R A C T

Background: Cigarette smoking is a major public health threat to the world with rising concerns during the COVID-19 pandemic. **Objectives:** To evaluate the effectiveness of a health belief model (HBM)-based educational intervention in improving knowledge, beliefs, self-reported smoking behaviors, and nicotine dependence among university medical students. **Method**: A randomized intervention was performed using permuted blocks randomization. Students in the intervention group (n=133) received health education intervention based on the HBM constructs and incorporated smoking related COVID-19 risks. Control subjects (n=129) received basic health education including smoking health related risks. The outcomes measured were: students' knowledge, beliefs, self-reported smoking behaviors, and nicotine dependence. Data were collected at baseline and 30 days post-intervention. **Results**: After the intervention, percentages of students who had high knowledge and belief scores had significantly increased from <5% to >45% in the intervention group ($p<0.001$). Mean nicotine dependence scores and percentages of daily and heavy smokers among students showed more improvement in the intervention group (3.9±1.5, 35.3%, 5.3%) compared to the control group (5±1.8, 48.8% and 12.4% respectively) ($p<0.001$) at 30 days post-intervention. Perceived COVID-19 risk susceptibility and risk severity significantly predict post-intervention reduction in moderate/heavy smoking ($p<0.01$ and $p<0.001$ respectively) and high nicotine dependence ($p<0.01$) in the intervention group. **Conclusions**: This intervention significantly improved knowledge, beliefs, self-reported smoking behaviors and nicotine dependence in medical students. Further research is needed for investigating the effectiveness of applying more complex and longer intervention.

INTRODUCTION

The global tobacco epidemic is a major public health threat, killing up to half of its users.[1] Tobacco use, including cigarettes smoking, is prevalent among university students given that university life could foster the initiation and maintaining smoking behaviors among youth.[2] Medical students are part of this population. Although they are aware about tobacco smoking health hazards, a significant number of them still smoke.[3] Moreover, COVID-19 pandemic related worry, stress and anxiety has been found to negatively influence smoking behaviors[4] and nicotine dependence among university students.[5] Tobacco users are more vulnerable to contract COVID-19 and are at higher risk of severe consequences or death from COVID-19.[6]

As a response to the critical impact of the dual smoking COVID-19 pandemic, and to the flawed controversial studies suggesting smoking having protecting effect against COVID-19,[7] the WHO

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Table 1: Descriptive statistics of participating students

Characteristics	Control group (N=129)	Intervention group (N=133)	*p* value
Age (mean±SD) (21±1.9)	20.9±1.9	21.1±1.9	0.605
Pre-clinical phase	19.2 ± 0.8	19.3 ± 0.7	0.815
Clinical phase	22.2 ± 1.4	22.5 ± 1.2	0.275
Study phase [n (%)]			
Pre-clinical phase	55 (42.6)	58 (43.6)	0.874
Clinical phase	74 (57.4)	75 (56.4)	
Family income [n (%)]			
Low (<5000 LE)	13 (10.1)	15 (11.3)	0.531
Medium (5000 to <10000 LE)	87 (67.4)	81 (60.9)	
High (≥10000 LE)	29 (22.5)	37 (27.8)	
Residence [n (%)]			0.696
With parents/relatives	70 (54.3)	67 (50.4)	
Alone in rented apartment	16 (12.4)	21 (15.8)	
With others in rented apartment	43 (33.3)	45 (33.8)	
Students' smoking duration (mean±SD)[n (%)]	14.2 ± 11.1	12.1 ± 8.3	0.417†
≤ one year	80 (62)	86 (64.7)	0.657
>one year	49 (38)	47 (35.3)	
Students reported having chronic diseases [n (%)]	9 (7)	11 (8.3)	0.693
Students reported past/current COVID-19 infection [n (%)]			0.886‡
Treated at home	14 (10.9)	16 (12)	
Hospitalized	5 (3.9)	4 (3)	
Family smoking			
Having ≥ one currently smoking family member [n (%)]	40 (31)	32 (24.1)	0.208
Duration of smoking (years) (mean ± SD)	11.3 ± 4	10.6 ± 3.6	0.555†
≤ 10 years	19 (47.5)	15 (46.9)	0.958
>10 years	21 (52.5)	17 (53.1)	
Positive history of chronic diseases in families [n (%)]	45 (34.9)	50 (37.6)	0.648
Positive history of COVID-19 in families [n (%)]			
Treated at home	52 (40.3)	46 (34.6)	0.719 ‡
Hospitalized	10 (7.8)	8 (6)	
Admitted to ICU	3 (2.3)	4 (3)	
Died	0	1 (0.8)	

†Mann-Whitney U test. ‡Fisher's exact test.

recommended in its strategies for fighting the global tobacco epidemic; to disseminate warning about the increased risk of morbidity and mortality from COVID-19 to all tobacco users.[8] In the pre-pandemic era, health educational interventions that included smoking health related risks and was grounded in the Health Belief Model (HBM) have proved their effectiveness in improving knowledge, beliefs, behavior of tobacco use, and in motivating tobacco cessation.[9,10]

In the context of the current pandemic, there is a crucial need to capitalize from the smoking related COVID-19 link as an opportune of the teachable moment concerning the increase in COVID-19 risks in smokers. Since the onset of the pandemic, and as of the time of writing no studies have examined the impact of including smoking related COVID-19 risks in a theory based educational intervention; to improve smoking behaviors and nicotine dependence among smokers. This study aimed at evaluating the effectiveness of a HBM-based educational intervention that incorporates smoking related COVID-19 risks in its construct; on knowledge, beliefs, self-reported cigarette smoking behaviors, and nicotine dependence among cigarette smoking medical students.

METHOD

This is an intervention study that was conducted in Faculty of medicine, Suez Canal University, Ismailia, Egypt from May 2021 to the end of December 2021. Using students' email distribution lists, a screening email asking if the student had ever smoked cigarettes during the past 30 days, and students answered 'Yes' were invited to participate in this

Table 2: Pre-post group and in-between groups' comparison of participants' knowledge and HBM components scores

Domains		Pre-intervention		Post-intervention		Pre-post group *p* value	
		Control group	Intervention group	Control group	Intervention group	Control group	Intervention group
Knowledge score	Mean ± SD	17.1 ± 3.3	16.7 ± 3.2	18.3 ± 3.6	23.9 ± 3	<0.001**	<0.001**
	Between-groups *p*-value	0.275		<0.001**			
	N (%) with high score [a]	12 (9.3)	16 (12)	35 (27.1)	94 (70.7)	<0.001**	<0.001**
	Between-groups *p*-value	0.475		<0.001**			
Perceived susceptibility	Mean ± SD	11.3 ± 2.6	11 ± 2.2	11.1 ± 2.6	15.4 ± 1.9	0.1	<0.001**
	Between-groups *p*-value	0.355		<0.001**			
	N (%) with high score [a]	21 (16.3)	13 (9.8)	25 (19.4)	116 (87.2)	0.572	<0.001**
	Between-groups *p*-value	0.117		<0.001**			
Perceived severity	Mean ± SD	10.5 ± 2	10.2 ± 1.7	10.8 ± 1.9	15.2 ± 1.9	0.170	<0.001**
	Between-groups *p*-value	0.090		<0.001**			
	N (%) with high score [a]	9 (7)	4(3)	10(7.8)	108 (81.2)	>0.99	<0.001**
	Between-groups *p*-value	0.163‡		<0.001**			
Perceived benefits	Mean ± SD	9.6 ± 2.2	9.1 ± 3.2	10.3 ± 2.1	14.8 ± 2.5	<0.001 **††	<0.001 **††
	Between-groups *p*-value	0.561†		<0.001**			
	N (%) with high score [a]	16 (12.4)	22 (16.5)	23 (17.8)	94 (70.7)	0.143	<0.001**
	Between-groups *p*-value	0.342		<0.001**			
Perceived barriers [b]	Mean ± SD	15 ± 2	15.2 ± 1.5	14.5 ± 1.5	10.2 ± 2.4	<0.001 **	<0.001**
	Between-groups *p*-value	0.358		<0.001**			
	N (%) with high score [a]	101 (78.3)	113 (85)	105 (81.4)	14 (10.5)	0.523	<0.001**
	Between-groups *p*-value	0.163		<0.001**			
Perceived self-efficacy	Mean ± SD	13.3 ± 3.6	12.7 ± 3.9	13.8 ± 3.6	19.1 ± 3.2	0.025 *††	<0.001 **††
	Between-groups *p*-value	0.347†		<0.001 **†			
	N (%) with high score [a]	19(14.7)	16(12)	25(19.4)	60(45.1)	0.210	<0.001**
	Between-groups *p*-value	0.521		<0.001**			

**Statistically significant at p < 0.05, ** Statistically significant at p < 0.01; † Mann-Whitney U test; ††Wilcoxon signed rank test; ‡Fisher's exact test; [a]. Scores ≥ 70% of domain's total score; [b.] High scores indicated low self-perception to overcome barriers to quit smoking*

study. Students who had decided quitting smoking or had participated in any smoking cessation treatment in the previous 30 days were excluded. Informed consent was obtained from all recruited students.

A sample size of 230 students (115 in each group) was estimated to be sufficient to detect a clinically significant difference given a previously estimated 1-point reduction in the mean Fagerstrom Test for Nicotine Dependence (FTND) score between the two groups [11] using a two-sided *t*-test, and an estimated ±2.3 standard deviation of FTND among medical students,[12] with 90% power and 5% significance

Table 3: Pre-post group and in-between groups' comparison of participants' self-reported smoking behaviors and nicotine dependence

Outcomes measured		Pre-intervention		Post-intervention		Pre-postgroup *p*value	
		Control group	Intervention group	Control group	Intervention group	Control group	Intervention group
Tobacco use frequency/week in the past 30 days [n (%)]	< Once/week	7 (5.4)	4 (3)	9 (7)	22 (16.5)		
	Once/week	9 (7)	8 (6)	23 (17.8)	21 (15.8)		
	2-6 Days/week	41 (31.8)	45 (33.8)	34 (26.4)	43 (32.3)	0.001**	<0.001**
	Everyday	72 (55.8)	76 (57.1)	63 (48.8)	47 (35.3)		
	Between-groups p-value	0.782‡		0.031*‡			
Tobacco use quantity (on days the student smoked) in the past 30 days [n (%)]	≤ 10 cigarettes/day	37 (28.7)	49 (36.8)	54 (41.9)	86 (64.7)		
	11-19 cigarettes/day	72 (55.8)	57 (42.9)	59 (45.7)	40 (30.1)	0.037*	<0.001**
	≥20 cigarettes/day	20 (15.5)	27 (20.3)	16 (12.4)	7 (5.3)		
	Between-groups p-value	0.111		0.001**			
Nicotine dependence	mean ± SD(5.8±1.8)	5.7 ± 1.7	6 ± 1.9	5 ± 1.8	3.9 ± 1.5	0.00**††	0.00**††
	Between-groups p-value	0.347†		<0.001**†			
Nicotine dependence level [n (%)]	Minimal	12 (9.3)	12 (9)	28 (21.7)	55 (41.4)		
	Moderate	70 (54.3)	64 (48.1)	75 (58.1)	58 (43.6)	<0.001**	<0.001**
	High	47 (36.4)	57 (42.9)	26 (20.2)	20 (15)		
	Between-groups p-value	0.557		0.003**			

**. Statistically significant at p <0.05; **. statistically significant at p <0.01; †. Mann Whitney U test was used for testing statistical significance; ‡. Fisher's exact test was used for testing statistical significance; ††.Wilcoxon signed rank test was used for testing statistical significance*

level. This number was increased to 138 per group, to allow for a predicted attrition of around 20%.

Randomization and Blinding: Permuted blocks [with block size of 4 (6 alternatives) and 6 (15 alternatives)] randomization procedure was followed. The random selection of block size and sequence, as well as the students' allocation to either the intervention or the control group was performed by a research assistant. The allocation sequence was kept concealed from research investigators who collected the data. Blinding of students was ensured by not giving any information about the allocation group and research authors analyzed blindingly the outcome measures between the allocation groups.

*Study Procedures and Intervention***:** Participants were instructed to follow one of two WhatsApp groups created for the purpose of the study, according to their assigned group. A link of a Google form containing the study questionnaires were sent to participants in both WhatsApp groups, and responses were collected at baseline and 30days post-intervention. The intervention comprised of two sets of audio-video power-point health educational materials disseminated through the WhatsApp groups. Students in the intervention group received an educational intervention with contents based on guidelines of the WHO and Centers of Disease Control and Prevention, [13,14] and a theoretical framework based on the HBM constructs [15] (**Figure 1**). The intervention included: smoking related COVID-19 risks, mechanisms through which smoking may increase the risks of COVID-19, benefits of tobacco cessation in lowering both general and COVID-19 risks, WHO recommendation for tobacco users in the context of COVID-19, steps of preparing to quit, barriers against quitting, and misinformation regarding smoking and COVID-19.

*Data Collection and outcomes measurement***:** Two self-reported questionnaires were used for data collection. The first is a two-section questionnaire developed by the researchers. The first section contains structured questions about students' demographics, medical history and smoking history of students and their families. The second section contains questions distributed in three domains designed for measuring knowledge (using 22 structured and semi-structured questions scored from 0-33), students' beliefs [using 27 structured five point Likert scale questions from 0-4: 5 questions for each of perceived susceptibility, severity, benefits, barriers (each scored from 0-20),

Table 4: Logistic regression for variables (knowledge and beliefs) that significantly predict post-intervention moderate/heavy smoking and high nicotine dependence in the intervention group

Predicting HBM construct		B	S.E.	Sig.	Odds ratio	95% CI for EXP(B)	
						Lower	Upper
Post-intervention perception of risk susceptibility	**moderate/high cigarette use quantity**	-0.446	0.129	0.001**	0.640	0.497	0.825
	High nicotine dependence	-0.784	0.207	<0.001**	0.457	0.305	.685
Post-intervention perception of risk severity	**moderate/high cigarette use quantity**	-0.303	0.114	0.008**	0.739	0.591	0.924
	High nicotine dependence	-0.674	0.201	0.001**	0.510	0.344	0.756
Post-intervention perception of benefits from	**moderate/high cigarette use quantity**	-0.086	0.087	0.323	0.917	0.773	1.089
	High nicotine dependence	0.032	0.128	0.804	1.032	0.803	1.327
Post-intervention perception of barriers	**moderate/high cigarette use quantity**	-0.073	0.086	0.395	0.929	0.785	1.100
	High nicotine dependence	0.046	0.117	0.696	1.047	0.832	1.318
Post-intervention perception of self-efficacy	**moderate/high cigarette use quantity**	-0.019	0.065	0.773	0.982	0.865	1.114
	High nicotine dependence	0.054	0.097	0.576	1.056	0.873	1.277
Post-intervention knowledge	**moderate/high cigarette use quantity**	0.038	0.067	0.571	1.039	0.911	1.185
	High nicotine dependence	-0.012	0.097	0.901	0.988	0.817	1.195

*. Statistically significant at p <0.05; **. statistically significant at p <0.01

and 7 questions for perceived self-efficacy (scored from 0-28)], and students self-reported smoking behaviors [using two structured questions with ordinal scale responses for denoting smoking frequency ("everyday" and "more than once a week", "once a week", less than once a week" for daily and occasional smoker respectively),[16] and quantity (light smokers; ≤ 10 cigarettes/day, moderate smokers; smoked 11-19 cigarettes/day, and heavy smokers; smoked ≥20 cigarettes/day)]. This questionnaire showed acceptable content validity, given feedback from two research experts in this field, and acceptable to good internal consistency of the belief's subscales Cronbach's coefficient α (0.73, 0.74, 0.77, 0.77, 0.8 and 0.9 for perceived benefits, perceived susceptibility, perceived self-efficacy, perceived severity, and perceived barriers respectively). The resultant questionnaire was then fulfilled from 20 eligible medical students who were not included in the study sample. Necessary changes in the questionnaire construction and re-wording based on students' comments were done. The second questionnaire is the FTND questionnaire, a previously developed tool that has acceptable levels of internal consistency and is closely related to biochemical indices of heaviness of smoking. The tool was designed to conceptualize nicotine dependence in cigarette smokers through physiological and behavioral symptoms represented in 6 items (four yes/no items that are scored from 0 to 1point, and two multiple choice items that are scored from 0 to 3 points) with an overall score ranging between 0-10 points; where "7-10", "4-6" and "less than 4" points indicated high, moderate, and minimal levels of nicotine dependence respectively.[17]

Statistical Analysis: Categorical variables were presented as frequencies and percentages and continuous variables were summarized as means ± SD. Chi-square, Fisher's exact, and Student's *t*-test/Mann Whitney U test were used for testing the significance of between-groups differences in the categorical and continuous variables, respectively. McNemar's, paired *t*-tests/Wilcoxon signed-rank test were used for intra-group pre-post differences in categorical and continuous variables respectively. Logistic regression analysis was performed to determine the variables (knowledge and beliefs) that significantly predict post-intervention moderate/heavy smoking and high nicotine dependence in both groups.

RESULTS

Analysis of participants' descriptive statistics revealed absence of statistical significance in difference between the control and intervention groups regarding demographic data, and history of smoking, COVID-19 infection, and chronic diseases

in students & their families (Table 1). In all participants, the percentages of students who had high knowledge and belief scores were 10.7 for knowledge and 13, 5, 14.5, 81.7 and 13.3 for susceptibility, severity, benefits, barriers and self-efficacy respectively. Baseline in-between groups' comparison of mean domains scores, and percentages of participants with high scores did not show statistical significance (p>0.05). After the intervention, mean scores of knowledges and beliefs and percentages of participants who had high scores showed marked improvement in the intervention group with statistical significance for in-between groups and for within intervention group differences (p< 0.001). Within control group comparison showed statistically significant improvement in mean scores of perceived benefits and perceived barriers (p<0.001), perceived self-efficacy (p<0.05), and in mean scores and percentages of students with high scores in the knowledge domain (p<0.001), with lower pre-post difference values when compared with their counterparts of within intervention group comparison (0.7-5.7, 0.5-5, 0.5-6.4, 1.2-7.2 and 13%-78% respectively) (Table 2).

At baseline, the in-between groups' comparison of tobacco use frequency, tobacco use quantity and nicotine dependence didn't show statistical significance (p>0.05). At 30 days post intervention, the intervention group showed statistically significant improvement in in-between groups' comparison for tobacco use frequency (p<0.05), tobacco use quantity (p<0.01), percentages of students with moderate/high nicotine dependence and mean nicotine dependence scores (p<001). The control and the intervention group both showed statistically significant improvement in within groups comparison, with higher effect size in the reduction of percentages of daily smokers (21.8 and 7%), moderate and heavy smokers (27.8 and 13.2%), students with moderate and high nicotine dependence (32.4 and 12.4%), and students' nicotine dependence mean scores (2.1 and .7) in the intervention group compared to the control group (Table 3).

Post-intervention perception of risk susceptibility and risk severity were found to be the variables among knowledge and beliefs variables that significantly predict post-intervention decrease in the odds of a student being moderate/heavy smoker (p<0.01 and p<0.001; OR 0.64; 95 % CI 0.49, 0.82 and 0.73; 95 % CI 0.59, 0.92 respectively) and the decrease in the odds of a student having high nicotine dependence (p<0.01; OR 0.45; 95 % CI 0.30, 0.68 and 0.51; 95 % CI 0.34, 0.75 respectively) in the intervention group (Table 4). None of the examined variables show post-intervention statistical significance prediction of these two outcome measures in the control group.

DISCUSSION

This intervention is unique in using the HBM framework that had proved its effectiveness in tobacco use control in the pre-pandemic era,[9] and in targeting the HBM related constructs that have proved predicting the anti-smoking behaviors amid COVID-19 era.[18] The lower baseline knowledge and beliefs scores among most of participants in the current study advocate the crucial need for improvement and usefulness of HBM as a framework for this intervention. No earlier studies have addressed the knowledge about smoking related COVID-19 risks among medical students in Egypt. However, a recent Jordanian study done by Alzoubi et.al (2020) was conducted on university students, but the including of nonmedical students in their sample has limited the comparison with the current study findings. [19] The low baseline knowledge scores in this intervention could be explained by the extensive circulation of invalid information about the protecting effect of smoking against COVID-19; particularly on social media. [20] The extensive circulation of misinformation would induce doubt in the veracity of the provided information, [21] debilitate the ability to discriminate valid from invalid information and create false perceptions of safety.[22]

Low baseline belief scores in this intervention could be also attributed to the low smoking related COVID-19 knowledge scores, which is consistent with earlier research indicating that beliefs about COVID-19 misinformation were associated with lower COVID-19 knowledge and lower adherence to preventive behaviors.[23] Low baseline perception of smoking related COVID-19 risks in the current study is consistent with an earlier study among adult smokers, which reported that most of smokers did not perceive themselves at greater risk of contracting COVID-19 infection or its serious complications if infected compared to nontobacco users.[24] Low risk perception in the current study could be related to the optimistic bias recently documented to accompany other risks related to the

COVID-19 case.[25] Studies examining the beliefs regarding benefits of quitting, barriers to quitting and self-efficacy to perform anti-smoking behaviors amid COVID-19 are scarce. The baseline high negatively perceived barriers to quitting and the low perceived self-efficacy in the current study were consistent with results of a previous study conducted on college students.[26] The low perceived benefits of quitting, and the low perceived self-efficacy to engage in antismoking behaviors could be due to the exclusive inclusion in the current study (for the study purpose) of students who were not contemplating quitting. Students who didn't intend to quit may have limited capacities to project the benefits they will feel or the challenges they should master during quitting.

In this study, the HBM educational intervention showed a significant improvement in students' knowledge and beliefs scores. These findings were consistent with findings of a previous HBM intervention study conducted to improve knowledge and beliefs of smoking related health risks among university students.[27] In the current study, knowledge, perceived susceptibility, and self-efficacy showed relatively low improvement compared to other belief components of the HBM. This could be due to provision of factual knowledge without considering either procedural knowledge or judgmental skills that would allow students to "know how" to apply, judge, and make decisions. The significant improvement in the mean scores of knowledges, perceived benefits, barriers and self-efficacy as well as in the proportion of students with high knowledge scores in the control group could be due to the impact of the general educational material they received, and to their seeking to gather information in order to fulfill a recognized need based on the health information seeking behavior model. [28]

No studies were conducted to study smoking behaviors among medical students in Egypt during the pandemic. One study had examined the frequency of tobacco use among medical students in Egypt before the pandemic but due to different case definitions, comparison between both studies was not feasible. [29] Another study was conducted in Egypt before the pandemic to assess tobacco use quantity and showed a lower percentage of moderate/heavy tobacco smokers than the counterpart percentage in the current study.[12] Inconsistency between studies could be explained by the difference in their population. It could also be due to the stress-related increase in smoking among university students during COVID-19 pandemic.[4] Medical students in the current study showed a higher level of nicotine dependence than that was found in a previous study performed before the pandemic in Egypt. [12] This difference could be attributed to the small sample size of smokers (40 students) and the use of different FTND scoring system in the earlier study, or to the increase in the addiction level among smokers due toCOVID-19 related stress and anxiety.[5]

In this study, smoking behaviors and nicotine dependence were significantly improved in both the intervention and control groups, albeit the intervention group showed significantly greater improvement. This finding agreed with a previous study that showed more effectiveness of a HBM-based cognitive behavioral therapy program for reducing FTND scores, compared to a basic health education program.[11] This study has identified the belief components (i.e., perception of smoking related COVID-19 risks susceptibility and risk severity) as significant predictors of post-intervention reduction in cigarette smoking quantity in the intervention group, which is consistent with the findings of a previous study conducted in the general population.[18] Also, the same belief components have been found to significantly predict nicotine dependence in the intervention group. These findings further support the potential impact of incorporating smoking related COVID-19 risks in such educational intervention.

Few limitations should be considered while interpreting the findings of this study. First, lack of female respondents in the study sample did not allow for investigating gender-specific differences and has limited the study generalizability. Second, the study did not consider the use of other tobacco products in combination with cigarette. Third, contamination due to the easy circulation of the educational material may have diluted the intervention contrast. Finally, this was a short-term intervention with limited ability to evaluate the intervention's effectiveness in maintaining smoking reduction and low levels of nicotine dependence over time.

In conclusion, a HBM-based educational intervention incorporating smoking related COVID-19 risks effectively improved knowledge, beliefs, smoking behaviors, and nicotine dependence among cigarette smoking medical students amid the

COVID-19 pandemic. A high perception of smoking related COVID-19 risks susceptibility and risk severity significantly predicted post-intervention reduction in moderate/heavy smoking and high nicotine dependence in the intervention group.

Ethical approval

The study obtained all required approvals from the research ethics committee (26/4/2021 reference # 4559) and the administrative body of Faculty of medicine, Suez Canal University.

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Conflict of interest

All authors have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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