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Original Research Paper

The Relationship Between Knowledge, Attitude, and Behavior Factors With the Implementation of Smoke-Free Areas in the Campus Environment: Literature Review

Hanan Aliya Putri, Ayu Khoirotul Umaroh*

Muhammadiyah University of Surakarta

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Email Corresponding:
ayu.khoirotul@ums.ac.id

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Abstract

Background: The prevalence of smoking among Indonesians aged ≥15 years was 36.3% in 2013 and decreased to 33.8% in 2018 (Riskesdas). The Smoke-Free Area (SFA) policy aims to minimize the adverse health impacts of smoking. Compliance in campus settings requires the academic community to follow regulations, such as refraining from smoking in designated SFA zones. **Objective:** To identify significant factors knowledge, attitudes, and behaviors associated with compliance to the SFA policy in the campus environment. **Methods:** A literature review was conducted following the PRISMA approach, using databases including Google Scholar, PubMed, and ScienceDirect. Inclusion criteria were full-text articles, quantitative cross-sectional studies with bivariate analysis, published in Indonesian or English between 2013–2023. **Results:** Four eligible articles were reviewed. Two focused on knowledge as a factor, two on attitudes, and one on behaviors influencing compliance. Findings indicate that higher knowledge levels, positive attitudes, and supportive behaviors contribute to improved adherence to SFA implementation in campuses. **Conclusion:** Knowledge, attitudes, and behaviors are significant factors in enhancing compliance with SFA policies. Promoting awareness and cultivating positive behavioral changes among the academic community can strengthen the success of smoke-free campus initiatives.

Keywords: *Knowledge, Attitude, Behavior, Compliance*

Introduction

Smoking has become one of the lifestyle changes due to globalization that impacts human health[1]. Cigarette consumption is very common in Indonesia despite widespread education about the dangers of smoking for various groups[2]. Cigarette smoke not only affects users but also adversely affects others exposed to it[3]. Smoking can endanger health because cigarette smoke can pollute the air and cause various diseases and even death[4]. In terms of health, the dangers of smoking are known to cause changes in lung tissue structure and function as well as respiratory tract disorders[5]. Cigarettes as a global commodity and industrial product made from about 300 different chemicals[6]. Additionally, cigarettes contain about 4000 compounds, 200 of which are toxic and 43 others cause lung cancer[7], stroke[8], cataracts[9], heart failure[10], asthma[11], hypertension[12], LBWR[13], and gastritis[14], so their use can endanger smokers themselves and pose health risks to the surrounding environment.

According to the World Health Organization (WHO), more than 5 million deaths are caused by smoking each year, with an additional 10 million deaths predicted by 2025[15]. In 2015 in Indonesia, an estimated 60 million people or about 36% of the population smoked[16]. Based on Basic Health Research (RISKESDAS) data in 2013, smoking prevalence in the population aged ≥15 years

was 36.3%[17] while in 2018 this prevalence decreased to 33.8%[18].

Law Number 17 of 2023 concerning Health is one of the regulations established by the government to address diseases caused by cigarettes and cigarette smoke. Smoke-Free Areas (SFAs) are also explicitly mentioned in Article 151[19]. Article 151 essentially states that SFAs include several arrangements, one of which is the teaching and learning process[20]. Technical regulations for controlling cigarettes or tobacco are also regulated in Government Regulation Number 109 of 2012 concerning Securing Addictive Substances in the Form of Tobacco Products for Health[21] and Minister of Health Regulation Number 86 of 2019 concerning SFAs also provides technical guidelines for implementing SFAs at the national level[22]. Additionally, local governments create regulations to govern SFA implementation. As of June 2023, about 86% of regions in Indonesia have regulations regarding SFA policies[23].

Smoke-Free Areas (SFAs) are spaces or places that prohibit smoking activities as well as the production, distribution, marketing, and promotion of cigarettes[24]. One government initiative to protect the general public including passive smokers from risks related to cigarette smoke exposure is the implementation of SFA policies. The purpose of implementing SFAs is to reduce high rates of death and illness caused by cigarettes[25].

Higher education institutions as venues for learning activities are among the places that must implement smoke-free areas. If SFAs can be implemented in higher education, this constitutes an active contribution to tobacco control efforts in Indonesia[26]. Forms of SFA implementation in the campus environment use media such as posters and no-smoking signs to convey messages or as transmission[27].

Compliance with the policy is also needed to facilitate SFA implementation in the campus environment. Compliance by campus residents can take the form of not smoking in the campus environment, reporting violations, not carrying tobacco products, consistent rule enforcement, and ongoing education to increase individual understanding of SFAs[28]. SFA compliance can be enforced if there are regulations and punishments, as well as support from the ability of regulation enforcers. Therefore, factors significantly associated with compliance with SFA implementation need to be studied. Several studies have examined factors related to compliance with SFA implementation. However, few studies have examined knowledge, attitude, and behavior factors in one discussion. Thus, the purpose of this study is to determine the relationship between knowledge, attitude, and behavior factors with compliance with SFA implementation in the campus environment.

Materials and Methods

Study Design

This research study is a Literature Review using the Preferred Reporting Items For Systematic Review and Meta analyses (PRISMA) method. Literature Review is a systematic review conducted by collecting articles, studies, or research from previous studies. According to Ramdhani et al (2014). The research procedure began with selecting the topic to be reviewed, namely assessing knowledge, attitude, and behavior factors that support compliance in implementing Smoke-Free Areas (SFAs) in the campus environment. In this case, PICO (Population, Intervention, Comparison, Outcome) was used to summarize the research focus, with the population including students and teaching staff exposed to SFA policies, intervention in the form of knowledge, attitude, and behavior factors, and outcome measured based on the level of compliance with SFA policies that can be seen from smoking behavior in prohibited areas. The next step is to trace and select relevant articles

using Boolean search strategies, combining keywords covering various aspects such as knowledge, attitude, behavior, compliance, and campus environment. After suitable articles are found, literature analysis and synthesis are conducted to conclude existing findings, then the results are written to provide a comprehensive picture of factors influencing compliance with SFA policies on campus.

Table 1. PICO Summary

Components	Information
Population	Students, teaching staff/education staff in the campus environment who are exposed to smoke-free area policies.
Intervention	Factors of knowledge, attitudes, and behaviors.
Comparison	-
Outcome	The level of compliance with smoke-free area policies on campus can be seen from smoking behavior in prohibited areas.

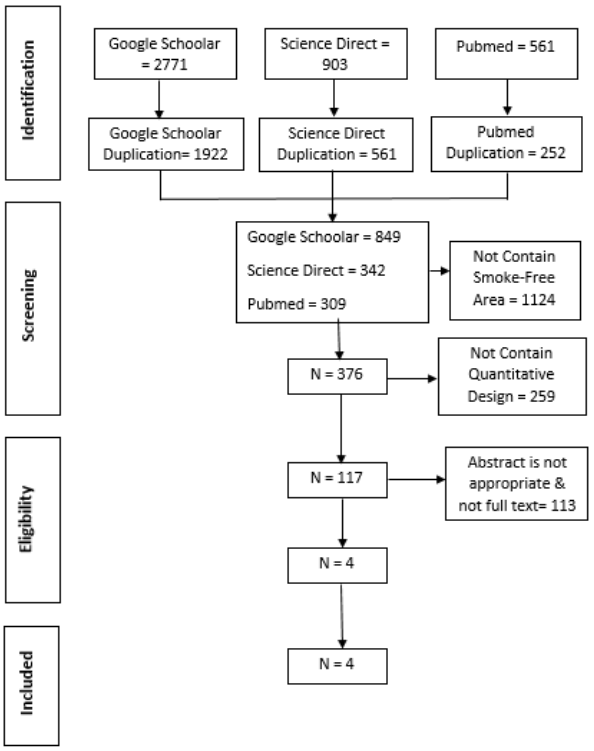

Figure 1. PRISMA Flow Diagram

Sample

Databases used in this literature search were Google Scholar, Pubmed, and Science Direct. Criteria applied in this study were article sources from predetermined databases, full-text, quantitative research methods, cross-sectional study with bivariate analysis, in Indonesian and English with publication years 2013 to 2023.

Data Collection Techniques

Literature searching used the Preferred Reporting Items For Systematic Review and Meta analyses (PRISMA) through four stages: identification stage, screening stage, eligibility stage, and final results. The following PRISMA Flow Diagram can be seen in Figure 1.

Data Analysis Techniques

Databases that passed selection were analyzed using critical appraisal to assess data validity and reliability. Then, data from relevant articles were synthesized to identify patterns or significant relationships between research variables. Data were analyzed based on relevant factors (knowledge, attitude, behavior) and summarized to draw general conclusions supporting the literature findings.

Ethical Consideration

This study is a literature review that did not involve direct research on human subjects or animals. Therefore, no ethical clearance from an ethics committee was required. However, the research process strictly adhered to ethical principles in scientific writing, including proper citation of all sources, avoidance of plagiarism, and respect for copyright and licensing of the articles reviewed. The study also complied with international research ethics guidelines by ensuring transparency, accountability, and integrity in the process of literature selection, analysis, and reporting.

Result

Based on the search with PRISMA, 4 articles remained that met the critical appraisal checklist for analytical cross-sectional studies. Critical appraisal contains eight points

consisting of; sample clearly defined, subjects and research background explained in detail, knowledge, attitude, and behavior factors measured with validity and reliability, conditions measured using objective standard criteria, confounding factors identified, confounding factors for handling strategies, compliance measured with valid and reliable methods, and appropriate statistical analysis. Of the 4 remaining articles, the first article met 6 points of critical appraisal, the second article met 8 points of critical appraisal, the third article met 7 points of critical appraisal, and the fourth article met 6 points of critical appraisal. Thus, all four articles are worthy of use as study materials in the research.

Table 2. Study Characteristics in Discussion

No.	Author and Year	Title	Sample	Research Results	Conclusion
1.	(Reno Renaldi, 2013)[29]	Implementation of KTR Policy for students in the Hang Tuah Pekanbaru Health Sciences College Environment	350 students	The findings of the bivariate test on three significant research variables were knowledge regarding the dangers of smoking (p <0.049), knowledge of the application of KTR (p value <0.000), and social environment (p <0.049).	A significant influence was found between the level of knowledge and compliance regarding the implementation of Smoke-Free Area in the Campus Environment. In addition, other relevant factors were found, namely the social environment.
2.	(Mohamed Bamashmous, 2018)[30]	Determinants of support for a smoke-free university policy	Students aged >18 years. (313 students)	Gender and smoking status have a significant relationship (p<0.002), willingness, knowledge and exposure have significant values (p<0.001), while awareness has a significant influence (p<0.004).	It was found that knowledge has a significant influence on compliance with the implementation of Smoke-Free Area in the Campus Environment. In addition, related factors were also identified, including smoking status, awareness, willingness and exposure to cigarette smoke.
3.	(Monique Chaaya, Fina F, Dahlia S, Mahmoud A, Maya R, Mary K, Rima N, 2021)[31]	Influence of a university tobacco free policy on the attitudes, perseptions of compliance and policy benefit among the university students	Staff and students aged >20 years (2,172 respondents)	Attitude factors have a significant relationship, namely (p<0.001), perceived benefits (p<0.004), compliance perception and behavior have a significant relationship (p=0.05).	It was found that there was a relationship between attitude and behavior factors with compliance with the implementation of Smoke-Free Area in the campus environment. In addition, other related factors were also found, namely perceptions of benefits and perceptions of compliance.
4.	(Sharyn Burns, Ellen Hart, Jonine Jancey, Jonathan Hallett, Gemma Crawforf, Linda Portsmounth, 2016)[32]	Evaluation of total smoking ban at a large Australian University	Staff and students aged >18 years (969 respondents)	Respondents reported that they were aware of the smoke-free policy (p<0.001) Attitudes towards a smoke-free campus there was strong agreement that the campus should be smoke-free in all buildings (p<0.001)	The study found that there was a relationship between behavioral factors in the campus environment and compliance with the implementation of Smoke-Free Area. In addition, other related factors were found, namely awareness.

Discussion

Smoke-Free Areas (SFAs) are important matters that must be implemented in higher education environments. The campus environment is a learning place where people are still found smoking and there are passive smokers inside it[27]. Compliance with SFA implementation includes all actions taken by the entire academic community capable of complying with regulations and applicable recommendations, such as not smoking in the campus environment[33].

Based on literature review results, several factors were found to be significantly related to

compliance with SFA implementation in the campus environment, consisting of knowledge factors, social environment, smoking status, awareness level, willingness, exposure to cigarette smoke, attitude, behavior, perception of benefits, and perception of compliance. From these factors, those that will be discussed by the researcher are knowledge factors, attitude, and behavior.

Knowledge Level with Compliance

Knowledge is an important factor for individuals, particularly influencing behavior regarding compliance with policies such as implementing Smoke-Free Areas (SFAs). Based on research by Renaldi in the first article, results with Chi Square test showed p = 0.000, meaning there is a significant influence with compliance in implementing SFA policy. Findings show that individuals with good knowledge are more likely to follow guidelines than individuals with lower knowledge levels[29] . Renaldi's research results showed that respondents implementing SFA policy showed 51% had good knowledge and 6.2% had poor knowledge. In research by Bamashmous in the second article, a significant relationship between knowledge and compliance with SFA policy was also found, indicated by p = 0.001. Bamashmous' research results showed that respondents implementing SFA policy showed 64% of respondents had good knowledge and 36% had poor knowledge. Programs such as socialization regarding SFAs need to be conducted continuously with the role of students, lecturers, and educational staff. Comprehensive knowledge of SFA guidelines is an important factor in improving compliance with these guidelines[34]. Individuals who understand the rules and benefits of SFAs tend to be more aware of compliance[35]. Therefore, efforts to expand knowledge through education, outreach, and integration of information into the curriculum are crucial to ensure successful implementation of SFA policies in higher education environments.

Attitude with Compliance

Attitude is a psychological factor that influences whether someone will comply with certain guidelines. Regarding SFAs, a positive attitude towards this policy can encourage individuals to comply with established regulations[36]. Based on research by Chaaya in the third article, results showed p = 0.001, meaning there is a relationship between attitude and compliance with SFA policy implementation. Chaaya's research results showed that respondents implementing SFA policy showed 90.5% non-smokers and 58.1% smokers had good attitudes while 9.5% non-smokers and 41.9% smokers had poor attitudes. Findings show that individuals with positive attitudes towards SFA policy tend to comply more with this policy. Attitude is also strongly influenced by understanding the benefits of the policy and perception of the social environment[31]. This positive attitude is usually based on the belief that SFA policy contributes to personal health and a cleaner campus environment. Conversely, individuals with negative attitudes towards the policy, such as feeling that the policy restricts personal freedom, tend to have lower compliance levels[37].

Based on research by Burns in the fourth article, results showed p = 0.001, meaning attitude factors are related to compliance with SFA policy implementation. Burns' research found respondents implementing SFA policy showed 71.4% had good attitudes and 47% had poor attitudes. Findings show most respondents showed positive attitudes towards SFA policy. This is seen from increased support for smoke-free campuses, including outdoor areas. Positive attitudes towards SFA guidelines are important factors in encouraging compliance with these guidelines. This attitude can be enhanced through education, supportive social

environments, and positive experiences in policy[32]. Therefore, strategies focusing on attitude change should be an integral part of efforts to implement smoke-free policies in campus environments[38]. Approaches including education, awareness raising, and smoking cessation support can help improve positive attitudes towards policies and encourage better compliance.

Behavior with Compliance

Behavior is a reaction or response of a person that can be observed directly/indirectly and characterized by individual responses to stimuli or the environment[39]. Behavior in this context refers to responses or actions of individuals towards compliance in implementing SFA policy[40]. Based on research conducted by Chaaya in the second article, $p = 0.05$, meaning there is a significant relationship between behavior and compliance with SFA policy implementation. Chaaya's research results showed that respondents implementing SFA policy amounted to 76% having good behavior and 21% having poor behavior. Findings show that individual behavior, particularly support for the policy and perception of its benefits, has a significant relationship with the level of compliance with SFA policy. There was a change in the proportion of student smokers decreasing from 26% to 21% one year after the policy was implemented. The implementation of this policy has produced positive changes in smoking behavior, including reduced smoking prevalence and increased awareness of the policy's benefits. Overall, SFA policy can be seen as a strategic step to create a healthier higher education environment, reduce smoking behavior, and increase compliance with health regulations[41]. To ensure these positive impacts continue, further efforts are needed in the form of educational programs, smoking cessation support, and additional research to strengthen the effectiveness of similar interventions in various situations[42].

Conclusion

Based on the articles reviewed, the underlying compliance factors for SFA implementation in the campus environment are knowledge factors, attitude factors, and behavior factors. The policy of implementing SFAs in the campus environment becomes a primary intervention strategy for controlling non-communicable diseases. Compliance with the policy is also needed to enable SFAs to be implemented in the campus environment. Therefore, comprehensive knowledge, positive attitudes, and behaviors that produce positive changes can increase compliance with these guidelines. Thus, with the implementation of SFAs, an atmosphere that supports health, comfort, and productivity of the entire academic community can be created. Further research is expected to assess other factors affecting compliance with SFA implementation. Additionally, project-based research needs to be conducted as an effort to improve SFA compliance.

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