Application of The Trans-Theoretical Model-Based Intervention on Smoking Behavior: A Systematic Review

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Abstract

Purpose: Smoking is a risk factor for various dangerous diseases. Smoking behavior is a public health problem that is difficult to be solved. Various interventions were carried out to stop smoking behavior. One of the interventions used to stop smoking behavior is an intervention based on the Trans theoretical model (TTM).

Methodology: This systematic review used keywords: smoking AND ("trans-theoretical model" OR "trans theoretical model") AND (male OR males) AND (adult OR adults) AND experimental. The data-bases used were: pubmed, science direct, google scholar, and opengrey. Narrative analysis was conducted to combine the articles.

Results: The search resulted 996 articles. After reducing duplication, the number of articles were 964. Screening with titles and abstracts resulted in 11 articles. There were 5 articles that fit the eligibility criteria. There was one protocol article and 3 experimental articles related to the application of TTM to smoking cessation behavior.

Applications/Originality/Value:: In general, the results showed that the TTM-based intervention for smoking cessation behavior worked well and gave good results as well.

Keywords: smoking, TTM, intervention

Introduction Section

Currently, the World Health Organization (WHO) estimates that tobacco use (smoking and non-smoking) is responsible for the deaths of ~ 6 million people worldwide each year (Idris et al, 2018). Tobacco use is a global problem and one of the leading causes of preventable death (Erol et al, 2018). Smoking control is a good example of what can be achieved in global health issue through global commitments. Since the adoption of the WHO framework convention on tobacco control in 2003, most countries have made great strides in implementing tobacco control measures (WHO, 2019).

Every year, more than 8 million people die from tobacco use. More than 7 million of these deaths were from direct tobacco use, while around 1.2 million were caused by non-smokers being exposed to second-hand smoke. Most of the tobacco-related deaths occured in low-and middle-income countries. The areas were indeed the target of intensive tobacco industry intervention and marketing (WHO, 2019).

It was reported that about 25% of all adolescents who experimented with smoking became regular smokers, and among smokers, about a third would die from smoking-related illnesses. The smoking epidemic has become a problem of global concern (Ali & Al-Asadi, 2010).

The continuing popularity of tobacco smoking appears to defy any rational explanation. Most smokers acknowledged the harm they do to themselves. They reported that they didn't enjoy it, but they continue to smoke. The reason was that the nicontin from cigarettes creates a strong urge to smoke. Progress is being made in many countries in reducing the prevalence of smoking, but it remains one of the leading causes of disease and premature death worldwide (West, 2017).

Behavior change is a very important aspect of health communication. Behavior change has been used as an intervention in various health problems (Ngigi & Busolo, 2018). Changes in human behavior do not work linearly. Experts have made several models of behavior change theory. These theories try to explain how the mechanism of human behavior changes. One of the well-known theories is the Trans-Theoretical Model.

The transtheoretical model (TTM) is aimed at understanding changes in a person's behavior and describes how humans move through five different stages of behavior change dynamically (Liu et al, 2018). The trans-theoretical model states that changes in human behavior take place through five stages as follows: the pre-thinking stage (the individual does not intend to change in the near future), the thinking stage (the

individual thinks there are some problems), the readiness stage (the individual may have set goals to change), the action stage (the individual has changed in the last 6 months) and the maintenance stage (the new behavior is automatic, the individual feels good). In undergoing this process, individuals often move back and forth through this stage, before finally reaching the final level, the maintenance stage. According to this theory, interventions are directed to fit the proper stage changes that occur step-by-step, will have a greater effect than directly aimed at changing behavior (Elezim et al, 2020). This study conduct systematic review of the application of TTM to smoking behavior.

Methods

This research is a systematic review study. The keywords used PICOS strategy and Boolean operator. Mesh was used to aid in keyword construction. Keywords used are: smoking AND («trans-theoretical model» OR «trans theoretical model») AND (male OR males) AND (adult OR adults) AND experimental. The data-bases used were: pubmed, science direct, google scholar, and opengrey. Eligibility criteria for this systematic review were: smoking, TTM, quasi or true experimental, adult, containing male samples or no explanation of gender, all countries, all races, English language, no time restrictions, original article or protocol, proceding. The exclusion criteria included: dissertation, thesis, pre-print, pre-proof, and article in press. Narrative analysis was conducted to combine the articles.

Results

Article search results

Searching for articles on several data-bases obtained the following numbers: science direct: 16, google scholar: 980, pubmed: 0, and opengrey: 0. After reducing duplication, the number of articles was 964. Screening with titles and abstracts resulted in 11 articles. There are 4 articles that fit the eligibility criteria. There was one protocol article and 3 experimental articles related to the application of TTM to smoking cessation behavior. The search result flow chart referred to PRISMA. The search result flow chart is shown in Figure 1.
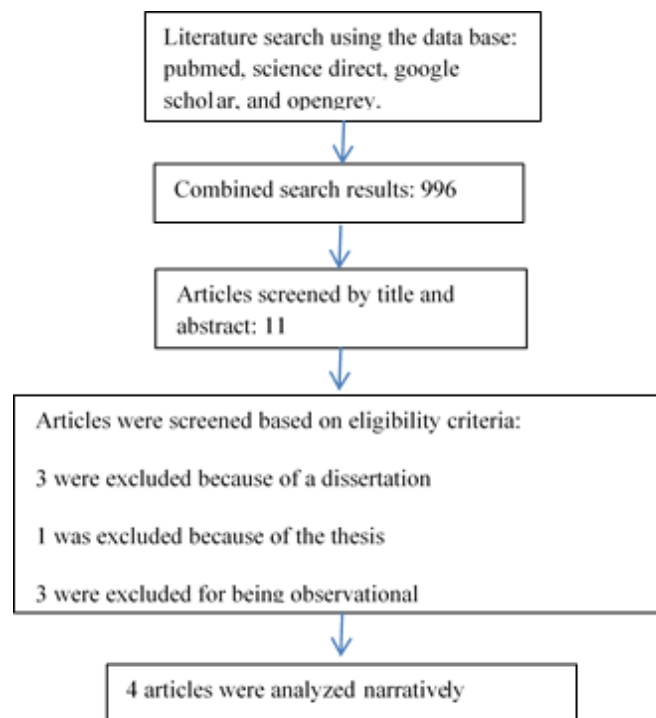

Figure 1. Flow chart of search results

Study characteristics

The characteristics of research studies are shown in table 1 below.

Table 1. Study characteristics

No	Author and year	Journal	Location	Design
1	Webb (2008)	Research in Nursing and Health	USA	quasi experimental
2	Pallonen (1998)	Substance use & Misuse	USA	quasi exsperimental
3	Güngörmüs et al (2012)	Southeast Asian J Trop Med Public Health	Turki	RCT
4	Cabezas et al (2009)	BMC Public Health	Spain	Cluster RCT Protocol

Table 1 shows that the study includes 3 experimental studies, and 1 experimental protocol study. The experimental studies consisted of 1 RCT and 2 quasi experimental. Two studies were conducted in the Americas and two in Europe. One study was conducted before 2000 and three studies were conducted after 2000.

Subjects characteristics

The characteristics of the research subjects are shown in table 2 below.

Table 2. Subjects characteristics

No	Author and year	Sample size	Subject characteristics and inclusion criteria
1	Webb (2008)	100	Age: 18-65 years Minimum average smoking is 5 per day Have an email address Not receiving tobacco treatment
2	Pallonen (1998)	704	10th and 11th grade high school students All students who are pleased and allowed by their parents Smokers, ex-smokers, not smokers
3	Güngörmüs et al (2012)	60	1st and 2nd year high school students who smoke
4	Cabezas et al (2009)	3024	Ages 14-75 Smoker Visiting primary clinic services

Table 2 shows that average of the study subjects were adult age, but there were also under 18 years of age. The total number of study subjects was 3888. The number of subjects varied from 60 to 3024. Not all studies explained the gender proportion of study subjects. Study subjects also varied between smokers, ex-smokers and nonsmokers. Research subjects also varied between those based on certain communities such as schools and those based on the general public.

The use of TTM in smoking behavior interventions

The use of TTM in smoking behavior interventions is shown in table 3 below.

Table 3. The use of TTM in smoking behavior interventions

No	Author and year	TTM application in intervention	Expected outcome
1	Webb (2008)	✓ Before the FGD, there was an instrument to assess the phase of the research subject, whether it was included in the pre-contemplation, contemplation, or preparation categories. ✓ Focus group discussion for 90 minutes was used to increase cognitive change, which included readiness to quit smoking and involvement in the change process	✓ After the FGD session, it was hoped that there would be an increase in cognitive changes in research subjects ✓ Cognitive changes include: readiness to quit smoking and involvement in the change process

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2	Pallonen (1998)	✓ There are two groups of research subjects: 1) intervention with education based on TTM, and 2) as usual intervention	✓ The expected outcome was not the difference in effectiveness between the two interventions, but rather the implementation and acceptance of the two programs themselves
3	Güngörmüs et al (2012)	✓ There were two groups divided randomly: 1) intervention with TTM-based education, and 2) without education	✓ The difference in smoking behavior between the two groups, both in smoking cessation behavior and the transition to a higher phase
4	Cabezas et al (2009)	✓ There are two groups, namely the intervention and control groups ✓ The intervention group was given intervention according to the level of the phase of change ✓ The control group was given as usual education	✓ Self smoking cessation reports confirmed by carbon monoxide levels ≤ 10 parts per million ✓ Change in phase of change

Table 3 shows that TTM-based interventions have been carried out with various variations. There were 3 interventions and 1 intervention protocol. The 3 interventions reported the results, whereas the protocol reported the desired outcome planned.

Study outcome

Study outcome was showed in table 4 below.

Table 4. Study outcome

No	Author and year	Outcome
1	Webb (2008)	✓ There was a significant increase in readiness to quit smoking and involvement in the change process
2	Pallonen (1998)	✓ A high level of participation indicated a high level of fisibility and acceptance of the two educational programs
3	Güngörmüs et al (2012)	✓ There were significant differences in the intervention group on smoking cessation behavior and the transition to a better phase ✓ The intervention group had better behavior
4	Cabezas et al (2009)	✓ There was no outcome yet, because it was an experimental study protocol

Table 4 shows that in general the outcomes in the intervention group based on the TTM theory showed better results than the control group. The results of Pallonen's (1998) study also show that educational programs to quit smoking can be accepted by research subjects.

Discussion

Davis et al (2014) stated that several behaviors related to tobacco use, alcohol consumption, dietary behavior, physical activity, and sexual practices play an important role in causing death in developing and developed countries. Behavior change techniques refer to specific strategies used in interventions that aim to encourage behavior change (Webb et al, 2010). Behavioral scientists have devoted a great deal of effort to develope and evaluate various models and theories designed to understand and/or influence health behavior (Rejeski & Fanning, 2019).

The main practical objective of behavior change research is to develop effective interventions (Michie et al, 2018). This systematic review shows that various TTM-based interventions on smoking cessation have been carried out. There was an experimental study protocol to apply TTM as well. In general, the results showed that the intervention for smoking cessation behavior worked well and gave good results as well. Marin-Farron et al (2020) stated that TTM has been used in several behavioral change studies related to physical exercise, chronic diseases, eating habits, etc.

The transtheoretical model is known as a behavior change model that is widely used in efforts to stop smoking behavior. Initially, this model was developed by Prochaska and DiClemente. This model uses appropriate interventions according to individual stages. According to this model, five stages must be passed for behavior change to occur. Motivational techniques are essential for successfully passing a stage and must be structured in preparation for the next stage. Each stage must be evaluated for the transition to the next stage. The transtheoretical model is an important tool for smoking cessation interventions because it has the ability to use multiple models of behavior change (Fidanci et al, 2017). Sarbandi et al (2013) also stated that TTM is a common framework for studying smoking cessation behavior.

Conclusion

The intervention to stop smoking behavior based on TTM was proven to be successful, both in terms of its implementation, acceptance and output. Stakeholders need to apply behavioral change theory-based interventions, especially TTM to reduce smoking behavior. More systematic reviews need to be done with better methods, for example without language restrictions.

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