Research Article

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Perceived Effects, Motor Dexterity, Cognitive and Affective Functioning Between Smokers and Non-Smokers among Selected College Students

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ABSTRACT

Background/Aim: Smoking addiction is a pervasive and high risk behavior linked with complex and damaging effects to a person's biology, behaviors, psychological well-being and cultural influence. Chronic smoking is also associated with increased risk of exposure to neurodegenerative diseases and cigarette smoking poorly affects both cognitive and affective functioning of the smokers. The perceived effects of smoking are often generalized by society such that it is viewed in extremes. This means that the societal perceptions are either smoking serves as a "relaxing mechanism", hence, making it as acceptable as any normal habit or that, conversely, smoking is gravely dangerous to one's health when considered as a vice. This research focused on the causal comparative ex post facto of smoking and its perceived effects to the psychological functioning among smokers and non-smokers.

Methods: O' Connor Finger Dexterity Test, Abstract Reasoning Test and Affective Functioning Assessment Test were used as bases of data comparison between the two groups.

Result/Conclusion: The test results indicate that there is a significant difference between the cognitive functioning and affective functioning among the smokers in comparison with non-smokers.

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Introduction

Smoking is a global epidemic, prevalent among the young and adult, one of the alarming public health issues in the world, and killing more than 8 million people in a year all around the world. More than 7 million of these deaths are the dire results of direct tobacco use and around 1.2 million are the result of non-smokers being exposed to second-hand smoke or the passive smokers. Around 80% of the world's 1.1 billion smokers live in low and middle income countries [1]. Smoking addiction affects mood, arousal and cognition of adults. There are abundant evidences of cognition impairments related to the different stages of smoking in the life of an adult.

Compulsion in smoking is a product of varying issues, including illogical justifications, individuality formation, and peer identity [2]. Media affected the way young people perceive smoking [3-5]. Similarly, smoking is associated with relaxation, maturity, identity, and socialization outweighing the negative effects of it. Thus, adolescents who internalize this belief without guidance are more likely to get engaged earlier in the habit of smoking which eventually leads to an addiction in their life [6, 7]. In

the Philippines, cigarettes are publicly available and smoking prevalence of young people from ages 13 -15 years old have increased from 13% in to 16%. A World Health Organization document even reported that, in this country, children as early as 9 years old start smoking [8].

Psychological functioning, namely in motor, cognitive, and affective aspects, is influenced by the nicotine component in cigarettes. Furthermore, effects of nicotine are being passed all throughout the sensory senses once used and it brings a deep thorough effect on the behavior. Nicotine depletion in the brain produces adverse effects such as fear, panic, and anxiety [9-11]. Moreover, cognitive functioning exposed in nicotine tends to be one of the recipients of its negative effects on health [12-14]. However, the discovery of its increased effects on attention, learning, and working memory function made it a considered treatment to specific illnesses. Chronic cigarette smoking seems to be associated with deficiencies in executive functions, cognitive flexibility, general intellectual abilities, learning or memory processing speed and working memory. Chronic smoking is related to global brain atrophy and biochemical abnormalities in anterior frontal regions. Chronic smoking appears to be also associated with an increased risk for various forms of neurodegenerative diseases. [15-18].

Perceived Effects of Cigarette Smoking

The perceived effects of smoking are often generalized by the society such that it is viewed in extremes. Some people see smoking as a way to unwind or to keep them calm in moments of tensions, thereby, justifying the urgency to indulge oneself in it. On the contrary, when one becomes addicted to smoking, it poses a severe threat on one's health status. Little do we know that cigarette smoking dependency is a very complex process because it can affect the total wellbeing of an individual, be it psychological, behavioral, biological, and cultural [19-21].

As a matter of fact, nicotine consumption through smoking is also blamed for avoidable death tolls [22]. This is mainly due to biological illnesses, such as in severe cases, chronic cigarette smoking can lead to pancreatic cancer, lung cancer, breast cancer, and laryngeal cancer and serious mental health issues [23, 24].

Researches also report strong associations between nicotine dependence and mental disorders, especially schizophrenia [21, 25-26]. Alarming new studies expanded the list of mental disorders associated to smoking such as deranged cognitive functions including alzheimer's disease, long-term prospective memory deficits, Attention-Deficit Hyperactivity Disorder (ADHD), and effectivity reduction of prospective memory or the cognitive ability used in recalling how to carry out specific actions anticipated to be done in the future [27, 28]. In relation to this study, one's psychological well-being can allegedly be in danger due to the findings that there is a significant relationship between psychiatric illnesses and smoking. Moreover, the presented idea that smoking may even be the one to blame for triggering such disorders [25, 29].

On one hand, the mere repeated inhalation of cigarette smoke, otherwise known as second-hand smoking or passive smoking, is also very harmful for the human body [27, 30]. Other health-related effects of cigarette smoking include adverse risks on pregnant women and their unborn children, reduced wound capacity repair and unsatisfactory healing after surgeries, and body weight changes due to eating and energy expenditure because it was observed that smokers weigh 3-4 kg less than non-smokers on an average basis. This comparison between smokers and non-smokers presents the significant differences not only in their possible dissimilar lifestyles but also to notably unlike short-term and long-term repercussions.

Prolonged Use of Nicotine and its Affective effects

Aside from the prior stigma that the longer an individual uses nicotine, the longer dependency rate it produces, it was also proven to produce psychological changes such as affecting arousal and mood [27]. The extent of its perceived emotional effects is also essential in order to know the degree of improvement or setbacks it has on a smoker's mood condition and the like, keeping in mind that a person's general performance in life is greatly influenced by his feelings.

In relation to gender, nicotine enhances the aggressive mood state of males contrasting to the calming effects it taps on females [28]. Prolonged smokers then showed consistent correlation increases in tension reduction and increased in vigor which can be related to the increased heart rate of those who smoke during social interactions and emotional processes [10, 16].

Similarly, cigarette smoking is also held responsible for increasing the risk of anxiety disorders such as agoraphobia, generalized anxiety disorder, and panic disorder during late adolescence and

early adulthood [31]. This was supported by Jacobsen et al., by saying that nicotine's neurotoxic effects tend to be more severe when exposure to such occurs at the early periods of development [32]. The former statement reveals that smoking can trigger higher level of effects in terms that these already developed into psychological illnesses. This is considered as a great extent of perceived effects due to its advanced consequences to smokers in relation to their affective wellbeing.

Further study reveals that lengthened usage of nicotine-containing products was also related to major depression and anxiety disorder. Depressed and anxious smokers were also reported to relapse significantly and withdraw worse compared to regular smokers [11]. There are many effective effects that smoking abstinence brings such as to build-up anew each day, with withdrawal ratings peaking in the evenings, thus came the claims of its relation to eating disturbances. The withdrawal phenomenon is claimed to produce significant distress especially with the presence of smoking cues that only leads to urge back to the old habit [28]. Withdrawal conflicts also heighten the extent of perceived effects of smoking on affective functioning in terms of the habit still influencing one's mood, anxiety, and stress levels even after cigarette smoking has been stopped.

This study aimed to measure the perceived effects of cigarette smoking to smokers in three variables namely: motor dexterity, cognitive functioning, and affective functioning in comparison with non-smokers. Findings in this research could serve as existing evidence on the direct effects of smoking on psychological functioning of smokers and to support other studies with similar results leading to the following hypotheses:

H.1: There is no significant difference in the motor dexterity, cognitive functioning, and affective functioning of smokers and non-smokers.

H.2: Smokers tend to have a significant decline in motor dexterity, cognitive functioning, and affective functioning compared to non-smokers.

Theoretical Frameworks

The Theory of Reasoned action was developed by Martin Fishbein and Icek Ajzen.

According to this theory, the individual's attitude and the norms representing the perception of others' view about a particular behavior will determine his behavioral intentions, which may further lead to the performance of a behavior.

In terms of norms, according to Shahab [33], the uptake of smoking behavior is strongly influenced by the smoking behavior of others surrounding a person. More so, if their friends smoke, or if their siblings smoke, they are even more likely to smoke themselves. Moreover, when smoking is portrayed among others who are seen as cool, sophisticated, rebellious, or fun-loving, teens often respond by copying the behavior and trying cigarettes themselves.

The Theory of Planned Behavior was proposed by Icek Ajzen to improve on the predictive power of the Theory of Reasoned Action by including the perceived control of behavior. Perceived behavioral control is said to be people's perceptions of their ability to perform a given action.

The Social cognitive theory was proposed by Albert Bandura, who is known for his Social Learning Theory. This provides a framework for understanding and predicting human behavior

through the interaction of personal factors, behavior, and the environment with one another.

The relationship between personal factors and the behavior involves person's thoughts and actions. For instance, smoking among college students makes them feel more daring and more adventurous. Next, the relationship between the person and the environment involves social influences. Subsequently, those who smoke may get remarkably influenced by older siblings, friends, relatives, and other people around him who smoke, especially if their parents were smokers now or in the past [33, 34]. The last relationship which is between the environment and the behavior involves how a behavior adapts to the environment such as in peer groups where the status as a "smoker" is central to the social identity of the group. Thus, members of the group are probably similar to one another in their smoking habits.

On a general perspective, perceived effects of smoking vary among individuals. It has negative effects on some while beneficial to others. Moreover, these also vary in terms of the affected areas in the health of an individual. Hence, the researchers focused and highlighted the perceived effects of smoking to just one area, the psychological functioning.

Treatment

For smoking cessation, numerous scientific studies found in existing literature have proven Cognitive Behavioral Therapy (CBT) as an effective psychological intervention [35]. CBT may include cognitive restructuring, mindfulness training, stimulus control, self-monitoring, functional analysis, impulse tolerance training, and emotion regulation training. CBT reinforces focus on alternative behaviors that replaces persistent or addicting behaviors by identifying and changing thought patterns that are ineffective; and is particularly supportive of people with depression and anxiety [35].

Methods

The study utilized the causal comparative research design. Causal comparative ex post facto knows the direct relationship between independent and dependent variable. Smoking has adverse effects on health, thus, ethical concerns were considered and no treatment conditions were applied on the study. Tests used to measure the motor dexterity and psychological functioning were the O'Connor Finger Dexterity Test, Abstract Reasoning Test and Affective Functioning Assessment. Non-random assignment of participants into smokers and nonsmokers group was employed during the initial assessment of the students by means of a survey while the three post-tests served as the basis for the comparison of the motor dexterity, cognitive functioning, and affective functioning between smokers and non-smokers.

The following assessment tools used to collect the data for this study are described as follows.

O'Connor Finger Dexterity Test

This test used to measure an individual's fine motor hand movements was designed by Johnson O'Connor, an Aptitude Researcher. The modified test conducted consisted of a board that has exactly 45 holes, each large enough to hold three (3) pins. The participant must sink in all three pins in the holes as fast as possible by using only one hand. The participant must use his dominant hand for thirty (30) seconds. The participant must not stop to pick-up any pins that were accidentally dropped along the process. Results are interpreted as follows: Low (0-3), Average (4-6), and High (7-9).

Abstract Reasoning Test

Abstract Reasoning Test, also known as Conceptual Reasoning Test, measures lateral cognitive skills. It is a written examination composed of 25 items including visuals of complex puzzles, information integration and series-patterned problems with four to five choices of answers. For the administration of this research, the time limit implemented was 20 minutes. Results are interpreted as follows: Low (0-8), Average (9-16), and High (17-25).

Affective Functioning Assessment

This is a 6-item self-constructed questionnaire that will serve as the affective functioning evaluation of participants. It includes questions pertaining to both the positive and negative experiences and perception, particularly about mood, relaxation, and stress, the participant has towards smoking cigarettes. Each item are ranked from 1 (lowest) to 5 (highest) based on the intensity of the feeling. Item generation was based on research and prior surveys. Results are interpreted as follows: Low (6-14), Average (15-22), and High (23-30).

Setting and Participant selection

A total of 60 health male, college students aged 16-24 years old studying in various universities were asked to participate in the study. They were grouped in two categories of smokers and non-smokers with 30 participants each. The selection of participants was based on certain characteristics. For the non-smoker's category, participants must have neither engaged nor tried to smoke before and were chosen randomly. For the smoker's category, participants must consume 1-10 sticks of cigarettes a day and must have at least one (1) year of smoking experience prior to the testing date. They were chosen from the group of students who were seen smoking in a smoking area near the campus premises. The aforementioned range of cigarette sticks per day was based on an earlier survey among male college students who were smoking. All the participants received snacks after taking all the tests as compensation for their cooperation.

Some exclusion criteria were also observed: usage of psycho-stimulants and exposure to regular or prescribed medication, e.g., drugs that contain anticholinergic properties such as antidepressants and antibiotics that can affect the cognitive function of the mind specifically the memory.

Selected smoker participants for testing should not be smoking more than 10 sticks a day and have been smoking for almost a year already. For the non-smokers, they should have never smoked even a single cigarette before.

Screening session and briefing procedures

For the certainty of the research in selecting smokers or the participants who are engaged in smoking, a step by step approach and procedure were applied. The participants were provided a survey form which consists of essential information for the study such as age, study course, average number of cigarette sticks consumed in a day, length of cigarette smoking engagement and contact information (Step 1). One week prior to the data gathering, smokers were surveyed alongside explaining to them about the nature of the study (Step 2). After the survey, smokers were briefed about their further participation in the study that they might be contacted for an experimental session wherein they will be assessed and will take tests to measure their psychological functioning (Step 3). In selecting non-smokers or the participants who are not engaged in smoking, the researchers randomly selected students whom he can conduct a survey, and explained to them as well the nature of the study and further briefing about

the experimental session (Step 4).

Experimental session

An "Informed Consent Form" was provided to each participant and the research protocol to obtain proper approval from the Manila Med Ethics Review Committee (MMERC) Ethics review board was observed (Step 1). The researchers properly explained the nature and the purpose of the experiment's variables namely, Motor Dexterity, Cognitive Functioning, and Affective Functioning and their relation to the study (Step 2). To measure the motor dexterity of the participant, the researchers used an improvised O'Connor finger dexterity test. A 30 second time limit was given to the participant, using the dominant hand the participant picked three nails and inserted it to the holes on the board. Exactly after 30 seconds, the participant was told to stop (Step 3). Participants then took a 25 item abstract reasoning test with a 20-minute time limit (Step 4). To know the affective reasoning of the participants, the researchers prepared a six-item affective assessment test to identify the affective reasoning of a participant. Non-smokers took a modified type of the test verifying non-smokers' affective perspective on smoking (Step 5). Then the researchers debriefed the participants and promised that confidentiality will be observed (Step 6). Finally, data were collected for interpretation (step 7).

Data Analyses

The research adapted the use of the T-Test Two Sample Assuming Equal Variances design formula to determine the answers to the following research questions:

1. What is the extent of the perceived effects of smoking when they were grouped into smoking and non-smoking group in terms of the following:

- 1.1 Motor Dexterity
- 1.2 Cognitive Functioning
- 1.3 Affective Functioning?

2. Is there significant difference in the perceived effects of smoking when they were grouped into smoking and non-smoking groups in terms of the following:

- 2.1 Motor Dexterity
- 2.2 Cognitive Functioning
- 2.3 Affective Functioning.

The data collected were tabulated and analyzed using a .05 margin

of error.. Analyses of data were guided by the use of mean score and standard deviation. Data gathered from the participants' psychological functioning in terms of motor dexterity, cognitive functioning and affective functioning were analyzed using SPSS. Research Question 1. What is the extent of the perceived effects of smoking when they were grouped into smoking and non-smoking groups in terms of motor dexterity, cognitive functioning and affective functioning.

Table 1: Mean Score and Standard Deviation of Motor Dexterity, Cognitive Functioning and Affective Functioning

VARIABLES	NON-SMOKERS n=30	SMOKERS n=30
	Mean Score (SD)	Mean Score (SD)
Motor Dexterity	6.00 (1.34)	5.9 (1.80)
Cognitive Functioning	13.5 (4.26)	8.9 (4.14)
Affective Functioning	18.2 (2.48)	12.65 (3.98)

Table 1 illustrates that the mean score and standard deviation comparison of the motor dexterity between non-smokers and smokers based on the O'Connor Finger Dexterity Test does not vary greatly as both of the groups yielded an average verbal interpretation. It means that smoking only affects motor dexterity to little or no extent when participants were categorized into smoking and non-smoking groups. Where as the Abstract Reasoning Test does vary for both of the groups in cognitive functioning scores. It means that smoking affects cognitive functioning of the smokers compared to the non-smokers. Mean score and standard deviation comparison of the affective functioning between non-smokers and smokers based on the Affective Functioning vary significantly in scores. It shows that smoking affects affective functioning of smokers compared to the non-smokers.

Research Question 2. Is there a significant difference in the perceived effects of smoking when they were grouped into smoking and non-smoking groups in terms of the following: motor dexterity, cognitive functioning and affective functioning.

Table 2: Results of T-Test Two-Sample Assuming Equal Variances of Motor Dexterity, Cognitive Functioning and Affective Functioning

Variables	Smokers (n = 30)		Smokers (n = 30)		T-stat	T- critical one - tail
	Mean	SD	Mean	SD		
Motor Dexterity	5.9	1.80	6.00	1.34	0.10	
Cognitive Functioning	8.9					0.69
Affective Functioning	12.65	3.98	18.2	2.48	1.43	0.49

The data analysis in Table 2 explains that T-Stat ($t=0.10$) is less than the T-Critical (1.49) variable for the psychological perceived effects of smoking of the participants when categorized into smoking and non-smoking groups. Therefore, the result of comparison of the ability of the brain in stimulating fine motor skills between non-smokers and smokers are not notable. Results of the assuming Equal Variances of Cognitive Functioning illustrates that T-Stat ($t=1.19$) is higher than the T-Critical (0.69). Which means that there is a significant difference in the cognitive functioning, as a variable for the psychological perceived effects

of smoking, of the participants when categorized into smoking and non-smoking groups. Hence, the result of comparison of the ability to analyze and solve complex abstract problems between non-smokers and smokers are notable. Two-Sample Assuming Equal Variances of Affective Functioning data analysis shows that T-Stat ($t=1.43$) is greater than the T-Critical (0.49). It means that there is a significant difference in the affective functioning, as a variable for the psychological perceived effects of smoking, of the participants when categorized into smoking and non-smoking groups. Subsequently, the results of comparison of the perception

and condition of mood, anxiety, relation, and stress levels between non-smokers and smokers are notable.

Discussions

The result of the study on perceived effects of smoking on motor dexterity reveals that the smoking group shows no significant decline on motor dexterity. It is based on the comparison of the scores in both groups using the O' Connor Finger Dexterity Test. In the result, the smoker group's scores do not have any significant difference compared to the non-smoker group's scores—the scores of the participants in the smoker group were almost equivalent to the scores of the participants in the non-smoker group. This finding indicates that smoking does not cause any decline on motor dexterity. In fact, according to Jarvik, nicotine contained in cigarettes has positive impact on motor dexterity in terms of speed and accuracy as well as focus and attention span [36].

On the other hand, the study on the perceived effects of smoking on cognitive functioning in the smoker group show a significant difference when compared to the scores of the non-smoker group. The outcome suggests that smoking cause decline or poor effect on abstract reasoning for the smokers group compared to the non-smokers group.

Perceived effects of smoking on affective functioning study shows a decline among the smoker's group. The scores of the smoker's group in the six-item self-constructed assessment have significant difference as compared to the scores of the non-smoker's group. This means that the perception of the smokers group have effect on the mood, stress, feeling of tension, relaxation, depression, and anxiety compared to the group of non-smokers group. In particular, smokers group tend to have more stress, tension, depression and anxiety that leads them to be more smokers. It is also asserted that one of the main causes of smoking among the majority of the smokers is to overcome stress, depression and anxiety. Nonetheless, it leads them to more complicated issues. On the other hand, the non-smoker group's perception of the effects of smoking to affective functioning is highly subjective depending on their known experiences with people whom they know are engaged in smoking. As a result, majority of these smokers experience negative effects in terms of their affective functioning.

Conclusion

Although many college students with mental health problems and poor psychological well-being exhort that smoking reduces their manifestations, in reality, they usually start smoking prior to the onset of their problems in life. Eventually, smoking leads to addiction and adds symptoms of mental health issues. Smoking reinforcement could be due to the initial cognitive improvement, that is, individuals can learn that smoking temporarily increases motor dexterity. Conversely, it does not show any negative effect among the smokers compared to the non-smokers' cognitive functioning (improving some components of attention and memory). Furthermore, smoking reinforces nicotine use which considerably contributes to the severity of nicotine dependence. However, heavy smoking is associated with cognitive deterioration and cognitive decline, as evident in the perceived effects of smoking on cognitive functioning result among the college participants. Smoking is strongly associated with disadvantages and is an important contributor to inequalities in health. In the final analysis, any short term benefits that smoking seem to offer, are predominated by the higher rates of smoking-related physical impairment problems such as lung cancer that are common to people with mental health problems. Finally, smoking is strongly associated with more disadvantages and is a significant contributor

to the degeneration of health. As the quote says, "Smokers don't grow old because they die young."

Limitations of the Study

Inevitable shortcomings prevailed despite the attempts to come up with the most valid and reliable study possible. Although the research was able to achieve its aims, there are still some limitations. First, the total number participants was not enough to represent the smoking population among college students aged 16-24. This should have been considered to raise the general applicability of the results. Second, despite the desire to use a wider range for quota sampling technique, more specific criteria for participant selection should have been implemented to avoid extraneous factors such as varying intelligence levels.

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