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日本の学生の喫煙についての知識とメタ認知方略の関連

高橋 幸子・山口 三重子

姫路大学大学院看護学研究科論究

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Abstract

At the time of writing this article, an antismoking campaign had begun in Japan, and both the media and government have subsequently been investigating people's attitudes towards smoking. In support of the objective of reducing smoking and improving public health in Japan, this study aimed to learn about Japanese university students' smoking habits, their knowledge and beliefs about smoking, and their use of metacognitive strategies. The purpose of the investigation was to explore the influence of university students' metacognitive strategies on their smoking habits and to provide recommendations for improved public education and propose more effective anti-smoking. Two hundred ninety-one university students aged 19–21 years participated in this study. The data collected were quantitatively analyzed. A questionnaire was used to collect the students' demographic data and assess their knowledge of the processes and their use of metacognitive strategies. The results showed that most participants were non-smokers, even though some of the participants' parents did smoke. Most of them knew the term "second-hand smoke." A factor analysis identified four relevant factors which were labeled as (1) Effectiveness of Strategy Use, (2) Knowledge about Oneself, (3) Human Mentality, and (4) Problem-Solving Ability. It was suggested that an anti-smoking campaign might target early teens because the participants who were smokers indicated they had started smoking in their early teens.

Keywords: smoking, university student, metacognitive strategy

要旨

本研究は、西日本の大学生を対象として、喫煙・受動喫煙に関する知識を調べ、非喫煙者のメタ認知方略を探り、どのような因子で構成されているのかを探った。西日本の大学2年生291人が調査に協力し、その内、喫煙者は10人であった。吉野ら(2008)が作成したメタ認知尺度の知識プロセスに関する質問23項目に対して、すべての質問に回答した270人から得られた回答は、4つの因子(方略使用の効果、自分を知ること、人間のメンタリティー、問題解決能力)に分類された。累積寄与率が37%であったことから、非喫煙者のメタ認知を説明するなんらかの材料を得たものと判断できる。対象とした大学生の中では喫煙者は少なかったが、これらの学生の喫煙開始時が早い時期であったことから、10代の早い時期からの喫煙対策を始めることが示唆された。また、喫煙を始めた理由が、友人との付き合いであったとのことから、自分をコントロールし、計画することができる能力—メタ認知能力—を養うことの重要性が明らかにされた。

キーワード：喫煙，受動喫煙，大学生，メタ認知方略

Background

Tobacco smoking culture and regulation in Japan

The World Health Organization (WHO) stated that death from tobacco use is one of the leading preventable causes of death, killing more than seven million people every year. At the time of writing, 181 Parties (member states) including Japan have signed the WHO Framework Convention on Tobacco Control, which is a global tobacco control instrument. This instrument was developed by countries in response to the globalization of the tobacco epidemic. Its aims include new tobacco users among young people.

There have been efforts in recent years to reduce smoking and protect people from second-hand smoke in Japan. A new national anti-smoking campaign has spurred investigations by the government and the media into peoples' attitudes toward smoking. The Tokyo Metropolitan Assembly passed a local anti-

smoking ordinance in June 2018 that is stricter than the national version currently under consideration. The 2018 Tokyo ordinance was enacted in a move intended to rein in second-hand smoke exposure and create a tobacco-free environment for the 2020 Olympics being held in the city. The anti-smoking ordinance also sought to protect the well-being of those deemed vulnerable, particularly children and employees, with a complete ban on smoking on the premises of public facilities such as kindergartens, schools, and daycare centers.

In July 2019, the Health Promotion Act, which had been put into force in 2003 for the promotion of citizens' health by self-supervision, was partly revised, requiring the removal of all smoking areas from schools and public offices. By April 2020, just before the Olympics, most restaurants must remove all smoking areas even though, prior to the revisions, Japan allowed smoking indoors with separate smoking and non-smoking

sections designated within the same area.

Previous studies regarding smoking in Japan

The Japanese Ministry of Health and Welfare (2016) announced that although the rate of smoking among Japanese high school students had decreased over the previous twenty years, smoking among young people was still a big issue for public health. There have been several studies regarding university students' tobacco use. Nakao et al. (2002, 2007) conducted a survey focusing on university students' smoking habits, their knowledge of diseases related to tobacco, and their attitude toward other people's smoking. Ogino (2017) also conducted a survey and found that the smoking status of students' mothers strongly affected the students' own smoking experiences.

Both studies implied that providing university students with health education for anti-smoking in the first year of their university life may be effective to reduce smokers among university students.

Previous studies regarding metacognition

Metacognitive strategies refer to one's abilities to control various cognitive activities (Brown, Bransford, Ferrara, & Campione, 1983; Wenden, 1998). Metacognitive strategies include goal setting, reflecting, evaluating, and revising (O'Malley & Chamot, 1990, Oxford, 1990). Although there are a variety of definitions regarding metacognition, most researchers agree that there are two processes involved (Sannomiya, 2008). Hacker and Graesser (2009) defined those two processes as: the "knowledge of cognition" and the "regulation of cognition." The knowledge of cognition focuses on knowing strategies to improve learning processes and knowing

which strategies to select. The regulation of cognition focuses on applying what one knows and taking action to improve one's learning processes and outcomes. Several researchers have tried to represent the two processes in concrete terms. Among them, Yoshino, Kaketa, Miyazaki, and Asamura created questionnaire items in a Japanese context and confirmed the validity and reliability of the questionnaire in identifying the two aspects of metacognitive strategy use. They prepared two sets of questionnaire items regarding the processes of knowing and regulation.

This study focused on the aspect of knowing, one of the two processes of the metacognitive strategy use, because knowing oneself was thought to be the first step in controlling the learning and managing ones' mental processes.

Aims

This study was conducted by nursing teachers and nursing students, who are expected to help people in the community manage their health. To learn more about how students process health information, this study examined typical Japanese university students' beliefs about smoking and the "knowledge" aspect of their metacognitive strategy use. It was hypothesized that non-smokers would employ metacognitive strategies in terms of tobacco smoking.

The research questions were:

1. What are the smokers in this sample of Japanese university students?
2. What knowledge do the students have about smoking?
3. What are the students' "knowing processes" in their use of metacognitive strategies?

Table 1
The Demographic Data for the Original Sample of the Student Participants in a Japanese Study of Smoking and Metacognitive Knowledge

| | | |
|---|--------------------|-------|
| <i>N</i> | | 291 |
| Ages | | 19–21 |
| Smoker/nonsmoker | Smokers | 10 |
| | Non-smokers | 281 |
| Gender | Male | 94 |
| | Female | 138 |
| | No response | 59 |
| Parents' smoke | Yes | 134 |
| | No | 156 |
| | | 1 |
| Influence of smoking | Aware | 291 |
| | Not aware | 0 |
| Aware of the anti-smoking ordinance | Yes | 288 |
| | No | 3 |
| Aware of the risks of second-hand smoking | Yes | 287 |
| | No | 4 |
| Attitude about anti-smoking ordinance | Don't agree at all | 3 |
| | Don't agree | 0 |
| | Neither Yes nor No | 16 |
| | Agree | 24 |
| | Agree strongly | 88 |
| | No response | 160 |

Note. Answers were expected to be given as Yes/No. Some items included multiple choices and the participants had to choose the correct item.

Ethical Consideration and Conflicts of Interest

This study was approved by the Okayama Prefectural University's Ethics Committee. There are no conflicts of interest in this study.

Methods

Two hundred and ninety-one university students, aged 19–21, participated in this study. They were all students from one university located in a mid-sized city in western Japan. With the head teacher's permission, students from 12 required general subject classes for all sophomores were asked to volunteer.

The response rate was 72%.

The data were collected using a survey that included questions about the students' demographic data, beliefs about smoking, and metacognitive strategies. The questionnaire items regarding metacognitive strategies were created based on the study by Yoshino et al. (2008), which reflected the knowledge of metacognitive strategy use.

Results

Demographic data

Demographic data were obtained using descriptive statistics (Table 1).

Table 2

Results of the Descriptive Statistics of 270 Non-Smoking Japanese University Students' Use of the 23 Variables of the Knowledge of Metacognitive Strategy

| Item | <i>M</i> | <i>SD</i> | <i>Range</i> | <i>Skewness</i> | <i>SES</i> | <i>Kurtosis</i> | <i>SES</i> |
|---|----------|-----------|--------------|-----------------|------------|-----------------|------------|
| 21. I prepare anticipated questions and answers when having an interview. | 3.28 | .72 | 3 | -.78 | .14 | .33 | .29 |
| 19. I answer easier questions first when having a time-constraint question. | 3.24 | .70 | 3 | -.69 | .14 | .38 | .29 |
| 20. I associate a technical term with various things when I want to understand it fully. | 3.14 | .68 | 3 | -.47 | .14 | .16 | .29 |
| 18. When I encounter an unfamiliar problem, I refer to a similar problem in my memory and apply the solution. | 3.11 | .63 | 3 | -.52 | .14 | 1.09 | .29 |
| 1. I know my strengths and weaknesses in learning. | 3.09 | .73 | 3 | -.59 | .14 | .30 | .29 |
| 22. I confirm the location on a map even if I have a memory of it. | 3.07 | .76 | 3 | -.57 | .14 | .13 | .29 |
| 15. With breaks, I become better when doing sports. | 3.03 | .79 | 3 | -.62 | .14 | .12 | .29 |
| 8. I feel I'm advantaged at this moment. | 2.96 | .80 | 3 | -.58 | .14 | .07 | .29 |
| 4. I know how much I can understand. | 2.90 | .67 | 3 | -.38 | .14 | .39 | .29 |
| 12. I tend not to forget something new if I learn it using related topics. | 2.89 | .76 | 3 | -.56 | .14 | .31 | .29 |
| 3. I know how much I can memorize. | 2.89 | .68 | 3 | -.34 | .14 | .28 | .29 |
| 14. I feel too many cooks make the dish dull in a group discussion. | 2.80 | .81 | 3 | -.19 | .14 | -.53 | .29 |
| 16. I prefer checking new information in books rather than browsing the Internet. | 2.79 | .75 | 3 | -.24 | .14 | -.22 | .29 |
| 13. I can concentrate on the lecture if I can see a recipe on the internet. | 2.71 | .88 | 3 | -.24 | .14 | -.64 | .29 |
| 10. I cannot convey my intention in written form very well. | 2.71 | .89 | 3 | -.29 | .14 | -.64 | .29 |
| 2. I know what steps are important for learning. | 2.58 | .75 | 3 | -.04 | .14 | -.31 | .29 |
| 17. I arrange items at random on purpose in order to make the testing environment harder. | 2.49 | .83 | 3 | .15 | .14 | -.54 | .29 |
| 7. I tend to accept more demands little by little. | 2.37 | .84 | 3 | .06 | .14 | -.61 | .29 |
| 6. I tend to accept somebody's invitation when he/she knows my weakness. | 2.22 | .82 | 3 | .26 | .14 | -.42 | .29 |
| 9. I make lots of typos when typing on a computer. | 2.14 | .84 | 3 | .53 | .14 | -.14 | .29 |
| 5. I ascribe my failure to bad luck. | 1.86 | .73 | 3 | .78 | .14 | .84 | .29 |
| 23. I focus on the discussion rather than taking notes. | 1.84 | .75 | 3 | .84 | .14 | .80 | .29 |
| 11. I carelessly call wrong numbers. | 1.76 | .83 | 3 | .83 | .14 | -.14 | .29 |

Notes. Items were created by Yoshino et al. (2008). The participants were to choose one answer from a four-point Likert scale (1 = strongly disagree to 4 = strongly agree).

Students' metacognitive strategies

Students' perceptions about metacognitive use were shown using the descriptive statistics and categorized by factor analysis.

The data of ten students who were smokers and 11 other students who did not fully complete the survey questions were excluded from the analysis of the students' use of metacognitive strategies. Thus, the data from 270 participants, who responded to all of

the questions on the questionnaire, were analyzed. The results of the descriptive statistics about metacognition are shown in Table 2.

Results of the factor analysis

In order to investigate patterns in the non-smokers' responses to the questionnaire items, all 23 variables were submitted for principal component analysis and factor analysis. The principal component analysis was

Table 3

Japanese University Students' Use of the 23 Variables of the Knowledge of Metacognitive Strategy Questionnaire Listed in Order of the Four Factors Solution for the Questionnaire Items

| Item | F ₁ | F ₂ | F ₃ | F ₄ | <i>h</i> ² |
|---|----------------|----------------|----------------|----------------|-----------------------|
| 20. I associate a technical term with various things when I want to understand it fully. | .74 | .18 | -.00 | -.14 | .61 |
| 21. I prepare anticipated questions and answers when having an interview. | .68 | .10 | .14 | -.29 | .58 |
| 18. When I encounter an unfamiliar problem, I refer to a similar problem in my memory and apply the solution. | .67 | .12 | -.03 | -.01 | .47 |
| 19. I answer easier questions first when having a time-constraint question. | .65 | .20 | -.01 | -.12 | .48 |
| 15. With breaks, I become better when doing sports. | .56 | .19 | -.07 | .00 | .36 |
| 22. I confirm the location on a map even if I have a memory of it. | .56 | .18 | .21 | -.05 | .39 |
| 16. I prefer checking new information in books rather than browsing the Internet. | .52 | .06 | .07 | .25 | .34 |
| 12. I tend not to forget something new if I learn it using related topics. | .45 | .08 | .05 | .13 | .23 |
| 14. I feel too many cooks make the dish dull in a group discussion. | .36 | .11 | .03 | .15 | .17 |
| 13. I can concentrate on the lecture if I can see a recipe on the internet. | .34 | .14 | -.06 | .08 | .15 |
| 10. I cannot convey my intention in written form very well. | .33 | -.08 | .25 | .09 | .19 |
| 3. I know how much I can memorize. | .17 | .77 | -.01 | -.01 | .63 |
| 4. I know how much I can understand. | .21 | .69 | .01 | .04 | .53 |
| 1. I know my strengths and weaknesses in learning. | .23 | .67 | .01 | -.07 | .50 |
| 2. I know what is important for learning. | .15 | .62 | -.06 | .14 | .43 |
| 6. I tend to accept somebody's invitation when he/she knows my weakness. | .05 | .03 | .72 | .00 | .53 |
| 7. I tend to accept more demands little by little. | .10 | -.03 | .66 | .01 | .45 |
| 9. I make lots of typos when typing on a computer. | .02 | -.01 | .38 | .10 | .15 |
| 8. I feel I'm advantaged at this moment. | .30 | .23 | .37 | -.17 | .32 |
| 5. I ascribe my failure to bad luck. | -.08 | -.04 | .31 | .12 | .12 |
| 17. I arrange items at random on purpose in order to make the testing environment harder. | .32 | -.02 | .03 | .51 | .37 |
| 23. I focus on the discussion rather than taking notes. | -.02 | .07 | .09 | .43 | .20 |
| 11. I carelessly call wrong numbers. | -.07 | -.02 | .27 | .35 | .20 |
| Proportion of variance | 2.22 | 7.40 | 5.65 | 3.77 | 37.05 |

Note. F₁ = Effectiveness of Strategy Use; F₂ = Knowing about Oneself; F₃ = Human Mentality; F₄ = Problem-Solving Ability.
n = 270. Factor loadings above .30 are in bold.

used to estimate the number of factors, presence of outliers, absence of multicollinearity and factorability of the correlation matrices. An orthogonal solution with principal factors extraction was then chosen in an initial run to estimate the exact number of factors. Overall, the solution with four factors met the researchers' expectation for satisfactory grouping into an adequate number of factors, so four factors were chosen.

The loadings of variables on factors, communalities, and percent of variance are shown in Table 3. The

variables are ordered and grouped by loading size. The factors were defined as F₁ = *Effectiveness of Strategy Use*, F₂ = *Knowing about Oneself*, F₃ = *Human Mentality*, and F₄ = *Problem-Solving Ability*. All variables were recorded in relation to the four factors.

Discussion

Answers to the research questions

1. Who are the smokers in this sample of Japanese university students?

Although the Japanese Ministry of Health and Welfare (2008) announced the low rate of smokers among high school students, they did not show the national data of smokers among university students. Nakao's study (2002) showed students at that time started smoking after entering university. Thus, the researchers assumed there would be more smokers. Many of the students of this study were over twenty, the minimum age for smoking. Nonetheless, the target group of students had a low rate of smoking (3%). The low number of smokers among the current university students might indicate that the percentage of the population who smokes has decreased.

Looking at their demographic data, their trigger to smoke was not influenced by their parents, which was also different from the study of Nakao (2002). Even though many of their parent(s) smoked, it seemed there was no influence from their parents. However, the ten smokers reported that they had started smoking socially in their early teens, which might be a big issue for public health.

2. What knowledge do the students have about smoking?

All students knew the influence of smoking. Although most of them understood the risks of second-hand smoking and knew the term "second-hand smoke" (288 out of 291), 16 participants gave neither "yes" nor "no" responses and 160 participants did not give any responses to the question about the anti-smoking ordinance. Japan's anti-smoking ordinances vary depending on the local governments, which might have made the term difficult for the participants to understand.

3. What are the students' "knowing processes" in their use of metacognitive strategies?

Only non-smokers' knowledge of metacognitive strategy use was analyzed because only ten smokers out of the 291 participants were found in this study. It was difficult to compare the two groups' use of strategies (smokers vs. nonsmokers) because of the size difference. The results of the factor analysis indicated the presence of four factors: *Effectiveness of Strategy Use*, *Knowing about Oneself*, *Human Mentality*, and *Problem-Solving Ability*.

Factor 1 included 11 items. Cronbach's alpha reliability coefficient for the 11 items was .81. All the alphas were below that figure if the respective items were deleted, which indicated that all the items fit in this factor. Four variables loaded in Factor 2. Cronbach's alpha for the 4 items was .80 and all the alphas for the respective items were below that figure if they were deleted. Five variables loaded on Factor 3. Cronbach's alpha was .60. Cronbach's alpha for the four items were below that figure if they were deleted. However, when the item 'I ascribe my failure to bad luck' was deleted, Cronbach's alpha increased. Furthermore, when a cut-off point for factor loadings was set at .33, this item would not remain in this list. Although it was found that this variable contributed little to the factor in a mathematical sense, it is believed to play an important role in *Human Mentality*. Therefore, this variable was retained. Factor 4 included three items. Cronbach's alpha was .41, which did not seem acceptable. However, Cronbach's alphas for the three items were below that figure if they were deleted.

Based on the finding that 37.05% of the variance in the data set was accounted for by the four factors, it is clear that the four factors play a meaningful role in the

participants' knowledge of metacognitive strategy use. The results of the factor analysis among non-smokers clarified that they had the knowledge of how to use the strategies effectively and of knowing oneself. Although qualitative research may be more sensitive to the participants' voice, the present study had shed on one aspect of non-smokers' metacognition.

Limitations of this present study

At the time of data collection, no definition was provided to the participants as to what is meant by "smoking" because cigarette smoking seemed to be most common to university students.

The present study only analyzed non-smokers' knowledge and use of metacognitive strategy, due to the insufficient number of smokers for comparison. It is not clear if the factors extracted from the data provided is unique to non-smokers because the data was not compared with that of smokers.

Questionnaire items regarding the knowledge and use of metacognitive strategies were used for the analysis based on the assumption that knowing oneself was thought to be the first step of metacognitive strategy use. Therefore, the results cannot be generalized beyond the particular process of metacognitive strategy use. Additional studies confirming the results and taking the research further by also examining the regulation of cognition should be conducted. A more robust and complete set of data for analysis would provide greater insight to achieve our aim of providing direction and information for effective strategies in community health education around smoking and other health issues.

Implications for guidelines

Although there were not many smokers in the present study group, the ten smokers who were found in the group stated that they started smoking in their early teens for a social reason such as maintaining a good relationship with their peers. It is advisable that people in their early teens should be informed of the risks of smoking and second-hand smoking with the collaboration of schools and communities if this is the point just before young people are likely to start smoking.

The results of the factor analysis among the non-smokers might imply that if people knew the effective use of strategies, they could control themselves and avoid the risks of damaging their health. It is also advisable that students should be taught how to use metacognitive strategies earlier in the teens.

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