

Original paper

# Factors Influencing Non-smoking Behavior during Early Stage Pregnancy: A Study of 39 Pregnant Women

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(Accepted November 2, 2004)

Key words: smoking, pregnant women, anti-smoking support, health promotion

## Abstract

A program was developed by the authors to assist pregnant women to quit or curtail smoking in accordance with N. J. Pender's health promotion theory of targeting subjects' behavior-specific cognition and affects. The following factors were examined to see how they affected continuity of non-smoking behavior during the early stages of pregnancy:

- Feelings of self-efficacy
- Motivation to smoke
- Ways of coping with stress
- Attachment to the unborn child

It was found that feelings of self-efficacy and attachment to the unborn child increased, while motivation to smoke decreased over time. It was also found that the subjects who quit smoking entirely (Group C) had different ways of coping with cessation stressors than the subjects who moderated their smoking (Group T).

All the research subjects who participated in the program either achieved full smoking cessation (76.9%) or were able to cut down on their smoking (23.1%). The subjects in Group T cut their smoking to 5 cigarettes a day or less.

## Introduction

It is estimated that 10% of Japan's population of pregnant women smoke[1,2]. It is typical for pregnant women who smoke to repeatedly quit smoking and start up again. Therefore a method of intervention is needed that involves subjects on a continuing basis, instilling a desire to quit and increasing their confidence so that they can resist the habit[3–5]. Most anti-smoking programs for pregnant women in Japan only teach about the danger to health. There are no programs of treatment or support for individuals. This paper reports on this study's success in providing effective support for efforts made by pregnant women to quit smoking. In view of the benefits derived in the form of improved health of mothers and children, the application of effective measures to promote non-smoking behavior is an important goal.

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Materials and Methods

**Subjects:** The subjects were 39 pregnant women who had been pregnant for less than 20 weeks, periodically consulted a clinic, and wanted to quit smoking. The subjects were from 3 hospitals in Nagasaki and Saga city in Japan. Research term: From February 15 to August 31, 2003.

**Methods:** This study referred to the “Revision Health Promotion Model” by Pender[6], and constituted a framework for behavior modification in order to quit smoking. Pender’s model uses four factors, Feelings of self-efficacy, Motivation to smoke, Ways of coping with stress, and Attachment to the unborn child to influence smokers. These factors were investigated in writing by using questionnaires. The authors carried out research at three intervals: before the subjects quit smoking, one month after quitting, and three months after quitting.

The authors also analyzed for change over time. In addition, the authors investigated 3 types of coping mechanisms (problem solving, emotion-focused and avoidance strategies)(Fig.1).

**Feelings of self-efficacy:** This study used ‘A Japanese Version of the Generalized Self-Efficacy Scale Utility from the Life-span Perspective[8]. This scale consists of 23 items, and 18 items that were suitable for pregnant women were extracted from them for use. It is assumed that the Self-efficacy Scale reception points added all up (18–90 point score ranges). The reliability coefficient of Cronbach’s alpha is 0.81points.

**Motivation to smoke:** This study used ‘The Reasons for Smoking Assessment Scale (RSAS)’ by Setoguchi[9]. It is assumed that the RSAS points added all up (18–72 points score ranges). A high score means a high motivation to smoking. This scale consists of 5 factors. The reliability coefficients of Cronbach’s alpha are 0.80, 0.79, 0.61, 0.73, and 0.57 points.

**Ways of Coping with stress:** This study used the ‘Stress Coping Scale’ by Haraguchi[10]. The coping scale consists of a problem focus model, feelings focus model, and evasion-escape type. The reliability

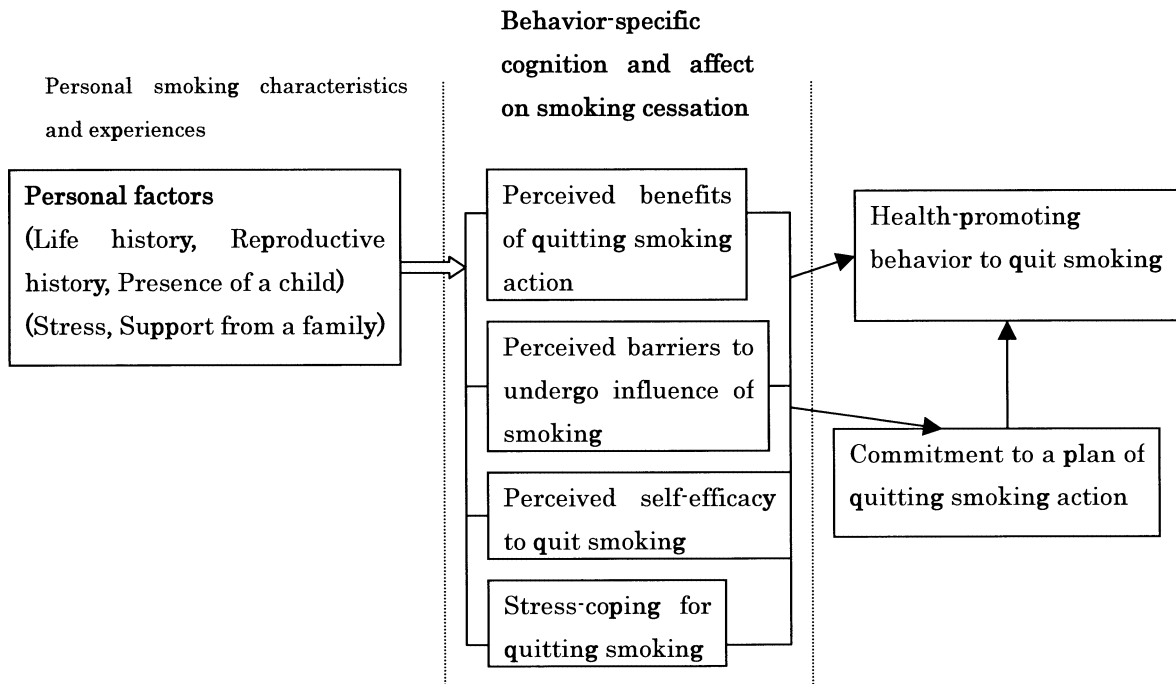


Fig. 1 Conception diagram of non-smoking behavior modification

coefficients of Cronbach’s alpha are 0.64, 0.80, and 0.72, points.

**Attachment to the unborn child:** We referred to the Attachment Scale (PMI) by Tsujino [11]. This scale consists of 21 items from which 4 items that were suitable for pregnant women were extracted for use. It is assumed that the Attachment Scale reception points added all up (4–16 points score ranges). The reliability coefficient of Cronbach’s alpha is 0.69 points.

The anti-smoking program for pregnant women (which was revised and modified based on Clinical Practice Guideline [7]) was used to counsel the research subjects and to provide support for quitting smoking. The period of intervention support was three months. The researcher visited on call, and the effects of these interventions were thereafter examined at each periodic office visit. The approach used to support the cessation of smoking used the method referred to the 5A approach (Ask, Advise, Assess, Assist, Arrange) of the general Clinical Practice Guideline used in both Britain and the U.S.A. In telephone visits and individual interviews, contents were recorded and analyzed (Table.1).

**Analysis methods:** We used SPSS for Windows (Version 11.5J) for statistical analysis and Friedman calibration in order to analyze changes over time. In comparison of the mean of the following two groups as defined below, we used Mann-Whitney-U calibration. We leveled significance with less than 5%. We recorded interview contents and encoded them, and we did a label charge account of an expressed behavior. We compared and analyzed differences of cessation of smoking behavior between both groups as defined below.

Definition of terms

**Group-C:** The group that quit smoking entirely with intervention supports

**Group-T:** The group that moderated their smoking but didn’t entirely quit smoking

Table 1 5A approach

.Brief Strategies to Help Willing Pregnant Women Quit Tobacco Use ‘The 5As’	
Action	Strategies for Implementation
Implement an office-wide system that ensures that for every clinical visit, tobacco-use status is queried and documented.	Step 1: Ask-systematically identify all smoking pregnant women at every visit.
In a clear, strong, and personalized manner, urge every tobacco user to quit.	Step 2: Advise-strongly urge all smoking pregnant women to quit.
Ask every tobacco user if she is willing to make an attempt to quit at this time.	Step 3: Assess-determine willingness to make an attempt to quit.
Help smoking pregnant women with a plan to quit (problem solving / skills training) Provide practice counseling. Help the pregnant woman to obtain extra treatment and social support.	Step 4: Assist-aid the smoking pregnant woman in quitting.
Schedule follow-up contact, either in person or via telephone.	Step 5: Arrange-schedule follow-up contact.

Approach methods to be general in case of cessation of smoking support in America and Britain

**Feelings of Self-Efficacy:** Belief in their own ability to do the behavior well

**Problem-solving coping:** This coping method enables the person to deal with environmental or other problems causing stress in certain situations.

**Emotion-focused coping:** This coping enables the person to deal with changes in feelings or ways of thinking as they are affected by different stress situations.

#### Ethical considerations

We obtained agreements from participants in the program after explaining the following:

- 1) The purpose of the study, its significance and methods.
- 2) Participation is on a voluntary basis.
- 3) All the information that we will get in this study should be used solely for research.

#### Results

1. The subjects: The mean age of the subjects was  $28.2 \pm 5.0$  years, the youngest being 19 and the oldest, 35 years old. The subjects included 16 primiparas and 23 multiparas. The mean age when the subjects began smoking was 17.8, the youngest being 14 and the oldest, 26 years old. Thirty-six (89.7%) of the women had started smoking before age 20, and 21 (53.8%) had been smoking for 10 years or more. The majority had smoked about 10 cigarettes a day, but the numbers ranged from two or three to 80 a day. Fifty-nine% of all the subjects were employed, including 60% of Group C and 55.5% of Group T.

2. Changes over time of factors affecting smoking behavior: The factors affecting non-smoking behavior were examined for comparison before the subjects entered the program, and then at the end of the 1st and 3rd months after the beginning of the program.

##### (1) Feelings of self-efficacy

Feelings of self-efficacy increased in both Group C and Group T (Group C:  $P < 0.01$ , Group T:  $P < 0.001$ ). Feelings of self-efficacy were higher in Group C than Group T before the subjects joined the program, but as a result of ongoing support, this factor became the same for both groups after the 3rd month (Figure 2). In interviews, Group C subjects indicated behavior consistent with active efforts to continue abstinence, while Group T indicated efforts to continue moderate smoking with a goal of quitting entirely. At one month after starting the program, Group C subjects were consistently giving responses indicating that their successful resistance to the desire to smoke had intensified their feelings of self-efficacy. Typical comments by Group C subjects were, "I really think I can quit" and "I didn't think I could cut down on smoking."

##### (2) Motivation to smoke

Motivation to smoke declined precipitately for both groups during the first 3 months of the program;  $P < 0.001$  for Group C, and  $P < 0.01$  for Group T. There was no significant difference between both groups before the program began, but at the 3rd month stage, motivation had declined most for Group C (Figure 3). Interviews showed that 1 week into the program subjects of both groups were resisting the impulse to smoke and groping for ways to deal with the challenge. Withdrawal symptoms disappeared in Group C subjects 1 month after quitting. The pressures of child care, general busyness and the lack of cooperation from husbands increased the desire to smoke among Group T, but their continuing efforts to moderate smoking with the goal of ultimately quitting lowered their motivation to smoke, and with the appearance of cooperation from their families at the 3rd month after the beginning of the program, they were acknowl-

edging that their desire to smoke was basically the result of habit.

### (3) Coping

Group T made extensive use of a problem solving strategy to maintain their moderated smoking behavior (Figure 4). This strategy involves specifying the number of cigarettes reduce the places for smoking, the use of tobacco substitutes, etc. Group C maintained non-smoking behavior mainly through emotion-focused coping strategies and avoidance of temptations to smoke (Figures 5, 6). Emotion-focused coping strategies involved stress-reducing relaxation, the use of tobacco substitutes and taking strolls or engaging in other types of light exercise, while temptation-avoidance involved intentional avoidance of passive smoking. In sum, Group C subjects were distinguished for dealing with stress as they improved problem-solving coping skills and temptation avoidance skills while Group T's strategies were primarily oriented toward problem solving.

### (4) Attachment to the unborn child

Changes of significant difference were found in both groups when surveyed before the start of and after the 3rd month of the program. Attachment to the unborn child increased over time for both groups, with Group C reaching a higher level than Group T (for Group C,  $P < 0.001$ , for Group T,  $P < 0.05$ ). Both groups showed increases in their affection for and attention to the unborn child after the beginning of the program (Fig.7). A typical comment from Group C subjects expressing relief at having quit smoking was the following at the end the 1st month of the program: "It is a relief to think that quitting smoking is good for the fetus."

### 3. Effectiveness of support for non-smoking behavior

All 39 people who participated in the program succeeded in quitting or cutting down on smoking. Group C (those who quit completely) consisted of 30 women. The remaining 9 in Group T succeeded in cutting their smoking down to 5 cigarettes a day or less (Fig.2-7).

## Discussion

1) Non-smoking behavior achievement through feelings of self-efficacy Using our non-smoking support program, we first checked to see if the subjects had the will to quit smoking, then proceeded to observe and support their efforts to achieve their goal. This procedure seemed to have resulted in stronger feelings of self-efficacy. According to Takamura[13], the success of health promotion strategies basically depends on the subjects having strong feelings of self-efficacy, as indicated by their enunciation of the goal and expression of the confidence in their ability to achieve it. Self-efficacy is a matter of the individual's assessment of their own ability to accomplish a goal. It is said to be increased by offering critical praise of the subject's efforts to reduce or stop smoking. Among the subjects of this study with periodic supports, their statements were suggestive of increased feelings of self-efficacy, for example, "I think I can quit", or "I didn't think it would be possible to quit". Group C showed higher self-efficacy values than Group T before the program began. Three months later, however, both groups showed high self-efficacy values without significant differences between the two as the result of their increased ability to maintain non-smoking behavior. We believe that greater feelings of self-efficacy helped to promote continuous non-smoking behavior.

### 2) Motivations to smoke

One week into the program, the subjects were resisting the temptation to smoke but also groping to find their own ways of dealing with the temptation. The result was that after one month of non-smoking there

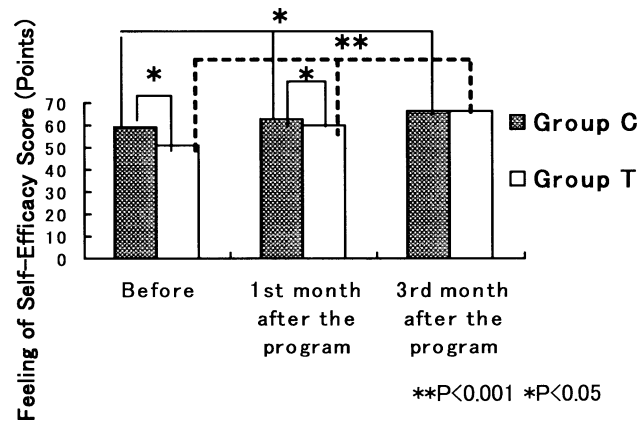


Fig.2 Feelings of self-efficacy for the non-smoking  
 Showing changes of self-efficacy in group C and group T with time.  
 \*\*P<0.001 \*P<0.05(Group-C: n=30, Group-T: n=9)

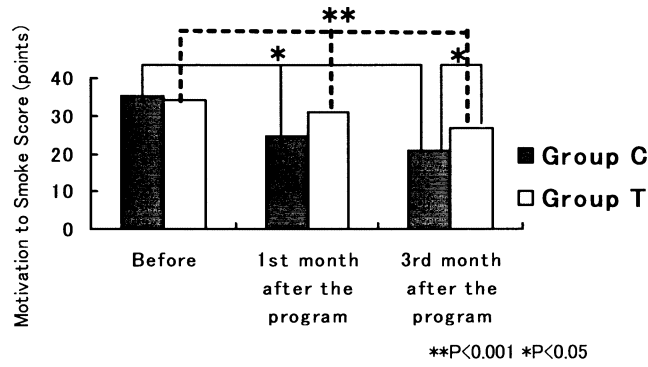


Fig.3 Motivation to smoke  
 Showing changes in smoking motives for groups C and T with time.  
 \*\*P<0.001 \*P<0.05(Group-C: n=30, Group-T: n=9)

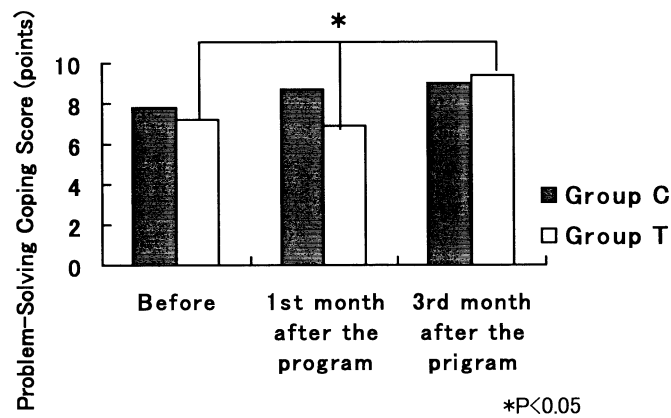


Fig.4 Problem-solving coping  
 Showing changes in problem-solving coping for groups C and T with time.  
 \*P<0.05(Group-C: n=30, Group-T: n=9)

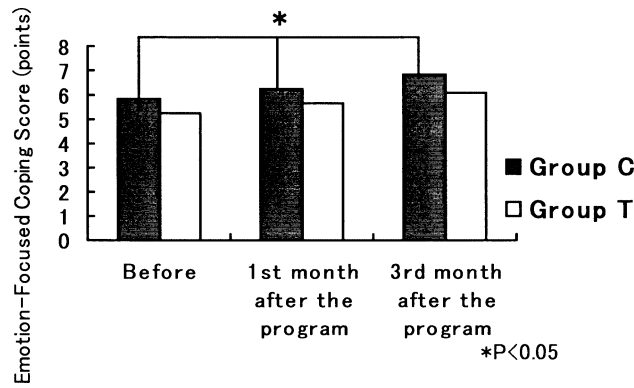


Fig.5 Emotion-focused coping

Showing changes in emotion- focused coping for groups C and T with time.

\*P<0.05(Group-C: n=30, Group-T: n=9)

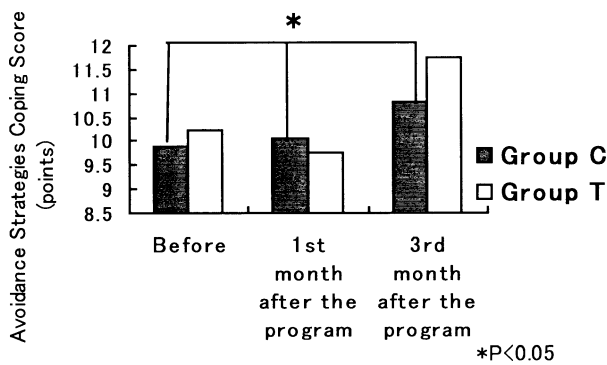


Fig.6 Avoidance strategies coping

Showing changes in avoidance strategies coping for groups C and T with time.

\*P<0.05 (Group-C: n=30, Group-T: n=9)

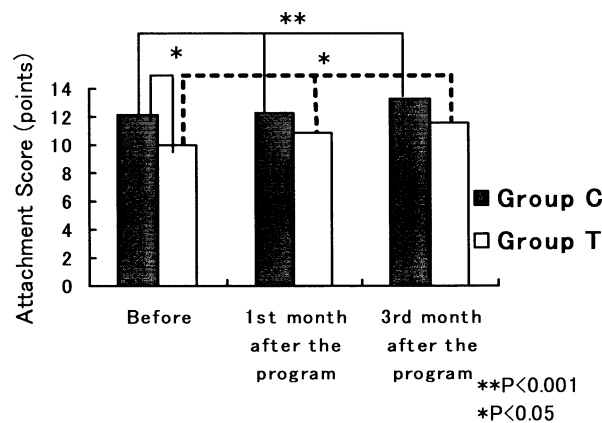


Fig.7 Attachment to the unborn child

was a significant decline in their motivation to smoke. Many of the subjects (all in early pregnancy) had less motivation to smoke because of morning sickness. Morning sickness is one of the behavior-changing factors, but, because the sickness does not involve a change in consciousness, it leaves open the possibility that the subject may resume smoking[13]. We believe that supporting non-smoking behavior during pregnancy,

when the subject is prone to experience changes in her sense of taste or preferences of various kinds, and encouraging awareness that non-smoking is in the interest of her own health as well as that of the fetus can be effective in reducing the desire to smoke after morning sickness disappears. In this way, pregnancy may offer a good opportunity for smokers to acquire non-smoking behavior. Nevertheless,

in this study, Group C had been smoking for an average 10.2 years, and Group T, 10.8 years. More than half had been habitual smokers for 10 years or more, and the longest smoking history was 19 years. Primiparas had smoked for an average 8.31 years and multiparas, 11.72 years. Satomura[14] has noted that it is very difficult for people having smoking histories of more than 10 years to kick the habit. Primiparas tend to have shorter smoking histories than multiparas and so may be in a better position to acquire non-smoking behavior. Our data also shows that some women have gone through pregnancy repeatedly while continuing to smoke. In this study, 87.5% of primiparas and 69.5% of multiparas succeeded in quitting smoking, this gap probably reflecting difference in their smoking histories. Nevertheless, one of the subjects in this study was able, with support, to kick her habit, even though she had been smoking 80 cigarettes a day. Fifty-nine% of the subjects were paid employees, a fact that probably contributed to their smoking rates. The workplace is a source of various kinds of stress. Another common motivation for tobacco use found there is the expectation that smoking is effective in encounters with other people, as seen in such comments as, "It's handy when you need something to do", "It makes it easy to talk to people" and "It makes me part of the group." The social environment has a great deal to do with motivation to smoke. This suggests a need for thorough implementation of such measures in the workplace as restricting smoking to specified areas.

### 3) Coping with stressors resulting from cessation of smoking

The subjects used cognitive strategies to cope with stressors resulting from continued abstinence. Problem-solving coping strategies are proactive. Specific examples include reduction of cigarette numbers, designation of smoking place and use of tobacco substitutes. Emotion-focused coping strategies included stress relaxation methods, use of tobacco substitutes, going for walks or light exercising. Avoidance strategies included intentional avoidance of passive smoking. Group T used problem-solving strategies extensively 1 month and 3 months after the program began, while Group C showed a high rate of dependence on emotion-focused and avoidance strategies 3 months after the beginning of the program. We encouraged the subjects to designate a place to smoke and to cut down on the number of cigarettes smoked by the day before the program began. We called on and asked about their preparations for quitting. Group C subjects had made their preparations and were ready for the first day of abstinence. We found that during the period of preparation the subjects tended to rely on problem-solving strategies, and then shifted to mainly emotion-focused and avoidance strategies after the onset of the program as a means of dealing with stressors from continued abstinence.

### 4) Attachment to the unborn child

A pregnant woman sticking to tobacco abstinence is acting in the interest of her own health and, by paying due respect to the existence of the unborn child, is recognizing being pregnant. Araragi[15] notes that a woman in the early stages of pregnancy experiences the awareness of the growing fetus, but after 20 weeks of gestation, abdominal enlargement and fetal movement provides convincing evidence to the woman of her motherhood. Earlier research similarly demonstrates that attachment to the unborn child increases over the course of pregnancy. Group T showed a less degree of the attachment than Group C, but increased its degree as time went on. We assume that Group T subjects' awareness of their motherhood increased the attachment, and at the same time their continued tobacco abstinence reinforced this feeling.



After 1 month of abstinence Group C subjects were expressing peace of mind that the fetuses were not being affected by smoking. This suggests that continued abstinence resulted in even greater attachment to the fetuses, which in time reinforced nonsmoking behavior.

## Conclusion

1. Implementation of the program of support with periodic intervention for smoking cessation for pregnant women brought positive changes in factors affecting non-smoking behavior, resulting in a 76.9% success rate (87.5% for primiparas and 69.6% for multiparas).
2. Feelings of self-efficacy were greater in the abstinent group of subjects (Group C) than in the group that cut down on smoking (Group T) as measured before the program began. The intervention resulted in higher feelings of self-efficacy for both groups as time went on.
3. The intervention resulted in lowered levels of motivation to smoke over time. Subjects' mastery of strategies for resisting the temptation to smoke during the period of lowered motivation due to physiological changes was effective in preventing resumption of smoking behavior later on.
4. The research subjects had smoking histories of more than ten years and had started smoking in their adolescence. Smoking prevention and intervention supports are necessary in an early stage of their life cycles.
5. During the period of preparation for the program it was necessary for the subjects to adopt problem-solving strategies. During the program, the use of emotion-focused and avoidance strategies was effective against stressors caused by abstinence.

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