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THE VALIDITY OF TRANSTHEORETICAL MODEL THROUGH DIFFERENT PSYCHOLOGICAL VARIABLES

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RESUMEN

El Modelo Transteórico es un modelo ampliamente utilizado para la explicación del cambio intencional, sobre todo cuando el cambio se refiere a conductas adictivas. A pesar de ello, también ha sido un modelo muy criticado, entre otros motivos por falta de validez. En este trabajo nos propusimos valorar la validez del propio modelo evaluando diferentes variables psicológicas distintas a los propios constructos del modelo: amplificación somatosensorial, hábitos de salud, actitudes y opiniones. La muestra estuvo compuesta por 347 estudiantes de la Universidad de Huelva. La participación fue voluntaria. Los sujetos fumadores se distribuyeron según las etapas del Modelo Transteórico de la siguiente manera: 40.0% precontempladores, 18.3% contempladores, 9,7% preparadores, 9.0% acción y 23.0% mantenedores. Los resultados obtenidos apoyan la validez del modelo.

Palabras claves: Modelo Transteórico; Validez; Adicción; Prevención; Salud.

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ABSTRACT

The Transtheoretical Model is widely used for explaining intentional behavior change, especially in addictive behaviors. Nevertheless, it is a much criticized model, due to its lack of validity. The aim of this study is to evaluate the model's legitimacy assessing several psychological variables which differ from the its constructs: somatosensorial amplification, health habits, concern for health, attitudes and opinions. For it we use a students' sample within the Huelva University. Participation was voluntary. The smokers were distributed according to the stages of the model Transtheoretical Change Model of the following way: 40.0% precontemplators, 18.3% contemplators, 9.7% preparers, 9.0% active, and 23.0% in maintenance. The results support the validity of the Transtheoretical Model.

Key words: Transtheoretical Model; Validity; Addition; Prevention; Health.

INTRODUCTION

The Transtheoretical Change Model (TCM) was created by Prochaska & DiClemente (1982; 1983) as an attempt to provide an answer to the factors common to intentional change. This model defends the various degrees of motivation leading towards change, and suggests that six variables which are the steps to change: stages, change processes, degrees of change, decisional balance, self sufficiency, and temptation (Prochaska & Velicer, 1997).

The ability to plan the therapeutic and preventative actions of el TCM is a widely-used model for addiction (Hodgins, 2001; Ruggiero et al., 1999; Rumpf, Hapke, Meyer & John, 1999; Tejero, Trujols, Hernández, Pérez de los Cobos & Casas, 1997), as well as in other health-related areas (Cabrera, Gómez, & Mateus, 2004; Keefe et al., 2000; O´Hea, Wood & Brantley, 2003; Wilson & Schlam, 2004; Wolk & Devlin, 2000); both in adults as well as adolescents (Pallonen, Prochaska, Velicer, Prokhorov, & Smith, 1998; Pallonen, Velicer et al., 1998).

The TCM pillars were used and validated in numerous studies related to tobacco consumption (Armitage, 2008; Cabrera 2001; Erol & Erdogan,

2008; Pallonen, Prochaska et al, 1998; Plummer et al., 2001; Prochaska, Velicer, Fava, Rossi & Tsoh, 2001; Velicer, Prochaska & Redding, 2006), and have proved it to be one of the most influential models in the study of behaviors related to quitting smoking (Segan, Borland & Greewood, 2004). However, different researchers (Davidson, 2001; Hodgins, 2001; West, 2005; Wilson & Schlam, 2004) have criticized the concept, the time frame, as well as the manner in which the different stages are evaluated.

Thus, this study has been designed to evaluate the validity of the TCM stages within the university population, using psychological variables such as somatosensorial amplification, health habits, concern for health, as well as two cognitive variables which have played an important role in the consumption of tobacco: attitudes and opinions (Cardenal & Adell, 2002; Cortés, Schiaffino, Martí & Fernández, 2005; Goebel, Crespo, Abraham, Masho & Glover, 2000; Jiménez-Muro, Beamonte, Marqueta, Gargallo & Nerín, 2009; Lacchetti, Cohen & Ashley, 2001; Unger et al., 1999).

METHOD

Experimental design

The Ex Post Facto prospective design method was used (Montero & León, 2007).

The sample

Accessibility criteria were used to select the sample (León & Montero, 2002) within the Huelva University student population. Participation was voluntary.

The sample included 347 subjects comprised of 85.6% female and 14.4% male students. Their median age was 20.89 (DT: 2.51), ranging from a minimum of 17 to a maximum of 30 years of age. 61.1% of the total sample were non-smokers. Using the WHO classification system, smokers were broken down into the following groups: 22.8% smoked on a daily basis, while 10.6% smoked occasionally, and 5.5% were ex-smokers.

The TCM breakdown indicates that 145 students smoked, distributed as follows: 40.0% precontemplators, 18.3% contemplators, 9.7% preparers, 9.0% active, and 23.0% in maintenance.

Variables and instruments

Variables taken into account were as follows:

Those related to consumption:

- **Daily consumption of tobacco:** number of cigarettes (or equivalent amount of tobacco) smoked per day.
- **Duration of daily consumption:** number of years during which the person has been smoking, as well as number of cigarettes per day.
- **Attempts to quit:** number of times the subject resolved to quit smoking, having gone at least 24 hours without a cigarette.
- **Nicotine dependence:** how strong the need to smoke is, and the ability to postpone it (Fagerström, 1978). The test used to evaluate degree of dependence was the Fagerström Test (Fagerström & Schneider, 1989). This test consists of 6 multiple choice questions. The range is from low dependence (punctuation of less than or equal to 3), average dependence (4 to 6), and high dependence (equal to or over 7).
- **Carbon monoxide exhaled:** the amount of carbon monoxide (CO) a subject exhaled at a certain point in time. This is measured in particles per million (ppm). The Micro CO MonitorTM was used to measure CO levels. The amount of CO in air breathed is considered an objective measure of abstinence, and allows for the subjective verification of the same person.
- **Living with smokers:** a series of questions were asked in order to evaluate smokers and their effect on other smokers living with them, as well as to evaluate the association with suffering of certain tobacco-related illnesses (for smokers as well as others).

Variables related to health and other psychological variables:

- **Concern about health:** degree of interest and affective involvement regarding health within people's values and belief (Castañeiras & Belloch, 2001). This was evaluated using the Health concern study (Castañeiras & Belloch, 2001) consisting of 16 questions regarding degree of concern and thoughts about health. Respondents answered questions on the 5-point Likert scale.
- **Somatosensorial amplification:** degree of sensitivity to slight corporal sensations which are uncomfortable and annoying but not pathological (Barsky, Wyshak, & Klerman 1990). The tool used for the evaluation was the Spanish version (Belloch, Ayllón, Martínez, Castañeiras, & Jiménez (1999)) of the Barsky Somatosensory Amplification Scale (Bar-

sky et al., 1990). This instrument estimates 10 states from 1-5 on the Likert scale, from which those tested must choose the degree to which the statement "characterizes them in general." The scale has demonstrated internal test-retest consistence and (Barsky et al., 1990).

- **Health habits:** General overall health, health care, number of sick days, including questions about sedentary behavior, and sleeping, and eating habits, using generic health questions (Reig, Cabrero, Ferrer & Richard, 2001). These questions were taken from the Health and Quality of Life Questionnaire given to university students, which generally evaluates health habits. It includes 8 questions answered on the 4-point Likert scale regarding self-image, eating, physical exercise, hypochondria, and how subjects look after their health; another 4 open questions regarding sedentarianism, physical exercise, and days ill; finally, there is a question with five alternative answers regarding their own health evaluation.

- **Anxiety:** The emotional response acting as a defense mechanism in the face of threatening stimuli. There are two defined types: state and trait anxiety (Spielberger, Gorsuch, & Lushene, 1982). The State Trait Anxiety Inventory (STAI) was created to measure anxiety (Spielberger et al., 1982), and is made up of two scales, each of which containing 20 items with four alternative responses: "None, some, fairly often, a great deal" on the first scale, and "Almost never, sometimes, almost always" on the second, with a punctuation of 0 to 3 depending on the amount and direction towards anxiety. The STAI elements are sufficiently discriminating and differentiating (regarding variables such as age or gender), and possess a good internal consistency (of between .90 and .93 on the A-E scale, and of between .84 and .87 on A-R scale) according to analyses carried out in order to adapt it for Spain (Seisdedos, 1988).

- **Depression:** this is a frame of mind which is characterized by sadness, melancholy, and a despondent lack of activity or interest in daily activities (A.P.A., 2002). This was measured using the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), consisting of 21 items. The subject was asked to evaluate the intensity of each of the emotions from 0 to 3. It is considered a reliable and trustworthy tool (Vázquez, 1986; Beck, Steer, & Garbin, 1988). The total score allows for establishing different quantitative ranges of depression: lack of or minimal depression (<10), between minimal or moderate (10-18), between

moderate and severe (19-29), and severe (30-63) (Beck et al., 1988). This study was carried out using the version adapted for Spain by Conde & Useros (1974).

- Opinions and attitudes about tobacco: Attitudes are relatively stable feelings about objects, events, or questions (McGuire, 1985). These can be broken down into three sections: the person's positive or negative opinion regarding smoking, beliefs, which are the affirmations which express a relationship between elements, and finally, the behavioral component, which describes how people behave when faced with the attitude. The Attitudes towards smoking (Musitu, Castillo, & García, 1989) questionnaire was used. It measures the attitudes of subjects regarding smoking using 19 topics referring to this habit, both in its pejorative sense (ex: it is a horrible habit), and positive (ex: it is attractive and gratifying). Subjects' attitudes were obtained (whether positive or negative regarding smoking), based on their agreement/disagreement with the questions asked on a 4-point Likert scale. Two factors are considered: the first is "tolerance" (11 items) ranked from 0 to 33, so that a higher score indicates a greater level of intolerance to smoking; the second is "social acceptance" (8 items) ranging from 0 to 24, with a higher score indicating agreement that smoking improves social relationships. Psychometric data indicate that a solid internal consistence of the scale, measured using the similarity of items (α de Cronbach = .86) as well as a good reliability coefficient when examining the relationship between the precision of the test as well as its length (the Spearman-Brown equation = .87). This questionnaire was chosen to evaluate the attitudes between different stages of change from a theoretical standpoint which differs from the transtheoretical model. To evaluate opinions, we selected the Opinions about tobacco questionnaire, (Becoña, Palomares, & García, 1998), which evaluates people's opinions regarding the effects of smoking. It consists of 12 affirmations to which subjects respond based on a 4-point Likert scale, with an overall score of between 0 and 36; a higher final score indicates greater disdain for smoking. The questionnaire allowed us to obtain the opinions of smokers and non-smokers within the sample as compared to the effects of smoking in general (ex: "smoking is enjoyable"), as well as on health in general (ex: "generally, smokers die younger than non-smokers").

Independent variable:

- **Stages:** Represents the time dimension of change, allowing for comprehension of when change occurs, whether it is cognitive, affective, or behavioral. These are the intentions and disposition towards change (Prochaska, DiClemente, & Norcross 1992). The stages taken into account in this study were as follows (DiClemente et al., 1991):

Precontemplation: the idea of quitting smoking has not crossed the person's mind.

Contemplation: the person plans to quit within the next six months.

Preparation: the person plans to quit smoking within the next 30 days, and has also tried to make some changes in conduct.

Action: the person has actively and successfully begun conduct change.

Maintenance: the person has been able to maintain the change of conduct for at least six months.

The University of Rhode Island Change Assessment Scale (1998) (URICA) was used for the distribution of the participants during the different stages.

Procedure

The study included a questionnaire phase using pencil and paper. The students were asked to participate in a study on health and smoking, and were informed of its aim, dynamics, as well as the confidentiality of the data. Those willing to participate signed a consent form, and were given questionnaires to fill out in the following order: the Smoker Evaluation Questionnaire, General Questions Regarding Health, Opinions And Attitudes Towards Smoking, Questionnaire On Health Concerns, Somatosensorial Amplification Scale, The State Trait Anxiety Inventory, Beck's Depression Inventory, The Transtheoretical Model Questionnaire, and the Fagerström test.

Statistical analysis

All analyses are carried out using the SPSS (v.15.0 Windows) statistical program. χ^2 was used for nominal variables, while *t* parametric interval tests and variance analyses were utilized.

RESULTS

The following socio-demographic variables were taken into account: age, sex, socio-economic group; significant differences were only seen in the age variable (($F_{(4,141)}$ =3, 17; p= .014)) (figure 1), with the differences specifically noted in the Precontemplation group (21, 81; *DT*: 2, 87) and the action group (19, 69; *DT:* 1, 88).

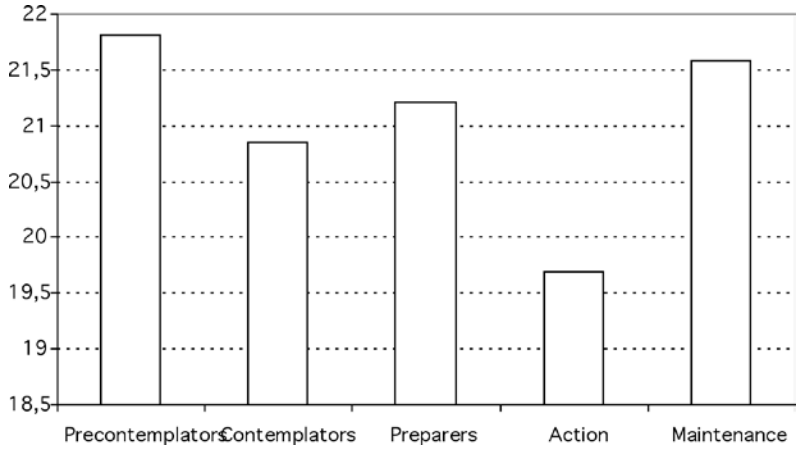

Figure 1: Distribution of the sample based on age and TCM stages

Comparing data regarding *tobacco consumption variables*, the average number of cigarettes smoked a day were: precontemplation: 9.65 (*DT:* 4.66), contemplation: 8.69 (*DT:* 4.93), and preparation: 9.20 (*DT:* 4.29). During these three stages, the amount of tobacco consumed was similar, with few significant differences ($F_{(2,76)}$ = .33; p= .71).

Another variable analyzed within this section was the how long the individual has been smoking on a daily basis. In this case, there are few significant differences ($F_{(2,76)}$ = 1, 83; p= .16); the precontemplators had been smoking longer (5.29 years; *DT:* 2.67) than the contemplators (4 years; *DT:* 2.28) or people preparing to (4.6 years; *DT:* 3.28).

Considering this key questions regarding whether a subject is in the TCM preparatory phase, "How many times have you stopped smoking during the past 24 hours?" there seemed to be an increased tendency in

the number of times since precontemplation (3.61; *DT:* 4.98), to preparation (8.70; *DT:* 9.41), despite there being no significant differences ($F_{(2,85)}$=2.12; p= .12). The tendency indicates a higher number of attempts to quit as the conduct change approaches.

Evaluating the degree of dependence using the Fagerström test, ratings achieved indicate that there were no differences during the pertinence stage ($F_{(2,76)}$ = .75; p= .47), which remained at low levels: 1.92 (*DT:* 2.34) for precontemplators, 1.80 (DT: 1.83) contemplators, and 1.14 (*DT:* 1.46) for those preparing to quit.

Finally, regarding the degree of carbon monoxide detected with the cooximeter, results indicated the existence of significant differences among the groups ($F_{(4, 90)}$ = 10.57; p= .0001). The group with the highest level of breathed carbon monoxide was the contemplators (8.31; *DT:* 5.58), followed by the precontemplators (6.71; *DT:* 6.39). The smokers planning to quit had lower levels of CO2 (4.80; *DT:* 3.85), and were the group with action and maintenance with the lowest scores (2.50; *DT:* 1.43 and 1.75; *DT:* 1.44, respectively).

Upon evaluating the responses about the effect smoking has on others living with the smoker, percentages differed regarding individuals living with regular smokers, (χ^2= 13.56; p= .019): the majority of those in the contemplation stage cohabitating with smokers (88.9%), followed by those in the action (69.2%), preparation (64.3%) and precontemplation stages (61.4%). Those in maintenance (54.5%) had the lowest percentage than those living with smokers.

When asked if any family members or acquaintances had suffered from any smoking-related illnesses, no significant differences were seen across the stages (χ^2= 6.32; p= .27); however, when the participants were asked if they had suffered any smoking-related illnesses, the responses were significant (χ^2= 23.44; p< .0001). The subjects who were planning to quit within the next month had suffered a higher percentage smoking-related illnesses, (21.4%), than contemplators (7.4%), individuals in the maintenance phase (6.1%), and finally, those in the precontemplation stage (1.8%). No individuals in the action phase claimed to have had problems of this sort.

When *Opinions and attitudes about smoking* were evaluated, there were notable differences regarding tobacco consumption as well as tolerance levels.

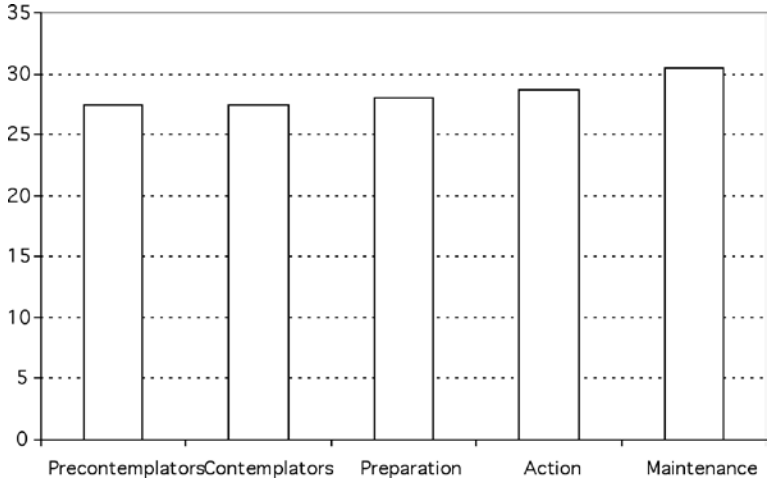

Figure 2: Opinions on smoking depending on TCM stages

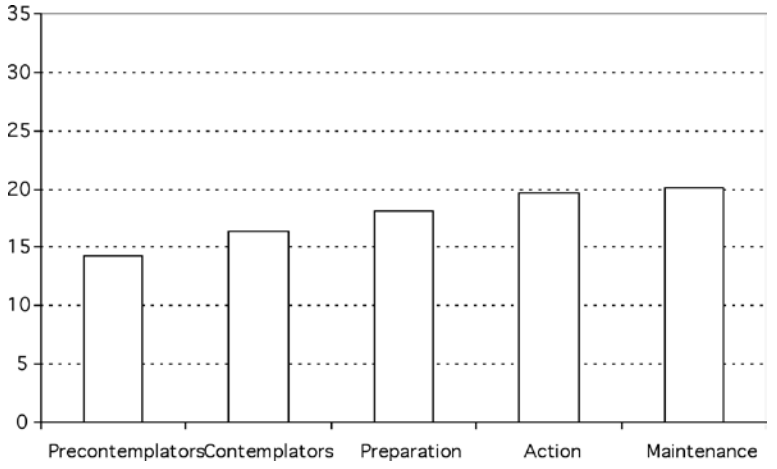

Figure 3: Tolerance attitudes regarding smoking according to TCM stages.

Results indicated noteworthy differences ($F_{(4,137)}$ =4.17; p= .003). The averages were noted (figure 2), and taking into account that a higher score indicates greater negativity towards tobacco, it is evident that average scores increase progressively in each group starting from contemplation to maintenance, with the opinions of the precontemplators and contemplators about equal.

A posteriori analyses indicated that the differences between precontemplators (27.44; *DT:* 3.48) with fewer negative opinions regarding tobacco consumption, defined themselves as in the maintenance stage (30.50; *DT:* 3.65), similar to contemplators (27.37; *DT:* 3.64) regarding those in maintenance. Thus, the precontemplators and the contemplators had the least negative opinions about smoking.

With regards to attitudes, a higher number can be seen in the average scores in the groups closest to intended change (Figure 3). There were significant differences ($F_{(4,139)}$ =7.99; p< .0001).

During the a posteriori analyses, the significant statistical differences were seen in the contemplators (16.37; *DT:* 5.42), and participants in maintenance (20.06; *DT:* 4.43). This time it was the subjects furthest from change and with a great deal of tolerance for smoking, as compared to those who are less tolerant or who have quit smoking.

Some consider that smoking helps with social interaction, and therefore, it is considered positive. On this occasion, contrary to the two previous situations, no significant differences existed ($F_{(4, 138)}$ = 2.38; p= .054).

In the evaluation of Health habits, two aspects were covered: beliefs and habits related to a healthy lifestyle. No differences were noted between groups with regards to sedentarianism ($F_{(4,140)}$ = 1.07; p= .371), as all of them spent at least two hours a day on the computer, walking a similar amount of kms. Per day (around three; $F_{(4,138)}$ = .87; p= .479), or were ill for a similar number of days ($F_{(4,135)}$ = 1.73; p= .162).

However, when they were asked "How well do you look after your health?" that is, their perceptions about health, the differences with notable (χ^2=23.19; p= .026). Results varied depending on the group as indicated in figure 4: the subjects in the maintenance phase considered they were healthier, while the precontemplation and action groups were the least concerned with their health.

No significant differences were observed from the evaluation of either of the anxiety aspects considered: state (F (4,132) = .45; p= .766) or trait

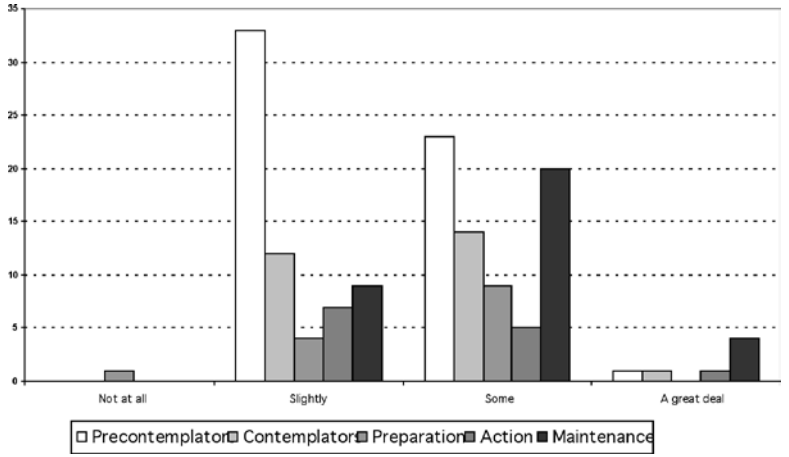

Figure 4: How well do you look after your health?

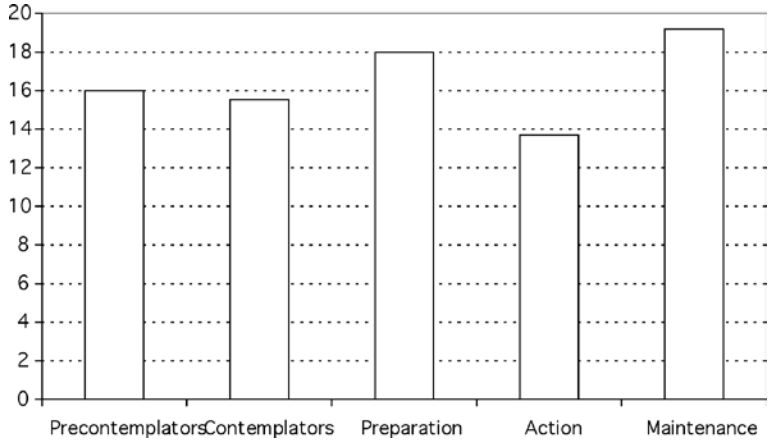

Figure 5: Somatosensorial amplification depending on TCM stages

($F_{(4,139)} = 1.85$; $p = .121$). In the analysis of depression, there were big differences ($F_{(4, 139)} = 3.28$; $p = .013$). The subjects forming part of the preparation stage (12.61; *DT:* 6.71) had a higher depression score as compared to the precontemplators (6.42; *DT:* 5.17).

Nevertheless, scores fell below clinical criteria.

When subjects were asked about the degree to which they were concerned with their health, the results did not show significant differences across the stages ($F_{(4,133)} = .70$; $p = .592$).

As far as somatosensorial amplification is concerned ($F_{(4,136)} = 2.94$; $p = .023$), striking differences were noted: subjects in the action phase (13.69; *DT:* 3.59) had the lowest scores on this scale, followed by those in the maintenance (19.21; *DT:* 5.45) and preparation stages (18.00; *DT:* 7.31) who indicated more sensitivity to body sensations (figure 5).

DISCUSSION

The beginning portion of the discussion regards sociodemographic variables: considering that the older subjects have no plans to quit smoking, while the younger participants who have managed to quit for at least 30 days, there are marked differences in age, which is an indicator that anti-tobacco campaigns are more effective in younger smokers.

Variables related to tobacco consumption indicate that there are no differences in subjects comprising the groups in this study (precontemplation, contemplation, and preparation): there were no dissimilarities in consumption, frequency of smoking, or number of years, or degree of dependence. This last piece of information proves that the results obtained through the different measures taken were due to the different stages, rather than the degree of dependence; also, the classification by stage is not linked to the profile of tobacco consumption, but rather to motivational criteria and intent to change.

When carbon monoxide levels were evaluated, significant differences were indeed noted. Contemplators (8.31; *DT:* 5.58) had the highest levels, followed by precontemplators (6.71; *DT:* 6.39) and those in preparation (4.80; *DT:* 3.85).

When discussing health habits, no remarkable differences were found apart for the following question: "How well do you look after your

health?" in other words, what is the perception about being in good health. Results indicate that the subjects in the maintenance phase are those who consider themselves preoccupied with health, while those in the precontemplation and action stages are less so. That is to say, there is a general homogenous profile for healthy behavior (which includes not smoking) which is standard for certain individuals as compared to those with unhealthy behaviors. Smokers did not necessarily also have other unhealthy habits; there are indeed results indicating a lack of concordance between health beliefs and habits (Moreno, Gil, & Blanco, 2006). Kirscht (1983) suggested that health habits are relatively independent of one another. Although different health behaviors and risk co-vary, they coexist as regards health or risk, and certain studies indicate that there is no association between physical exercise and abstinence from smoking (Blair, Jacobs, & Powell, 1985).

In summary, it can be established that according to our results, smokers in the precontemplation stage are more tolerant regarding tobacco consumption. Contrarily, those thinking about quitting in the distant future stand apart from the other stages: although they are not more avid consumers of tobacco, their breathed CO2 level prior to experimental tests were higher than all the other stages, and they were those who were most often surrounded by other smokers.

Those preparing to quit planned to do so in the near future, and were characterized with higher depression scores, as well as in somatosensorial amplification, with a higher number of individuals having recently experiencing a smoking-related illness. This makes it easy to understand this stage as one of special sensitivity towards the consequences of smoking. Mateos (2003) indicates that one of the most relevant motivations for quitting smoking is that smokers begin to suffer the negative effects of tobacco on their health.

In the analysis of the different stages based on being smokers per se, as well as beliefs and attitudes about tobacco and other psychological variables, it is evident that participants' opinions about tobacco varied depending on the stage: the further from the change stage, the fewer negative opinions smokers had regarding the habit, and there is an increase from the precontemplation phases to the maintenance phase. This indicates that subjects in the stages nearest to change have more negative opinions. This very tendency regarding tolerant attitudes shows a steady

increase in the attitudes of intolerance towards the conduct of smoking, from precontemplation to maintenance, indicating that precontemplators are significantly more tolerant about smoking, which is a clue that as subjects move towards behavior change, smoking is tolerated less and less. These results agree with findings obtained by Jiménez-Muro, et al. (2009) using a sample of University Freshmen; the only exception was that the comparison was made between smokers and non-smokers. Among the results obtained in research carried out by Kleinjan, van den Eijnden, Dijkstra, Brug, & Engels (2006) regarding cognitive variables, beliefs used as justification to continues smoking were more often seen in precontemplators, contemplators, and preparers. In this longitudinal study, the authors concluded that smokers justified their habit, and that strong beliefs inhibited the progression towards quitting, and that therefore, motivating the smokers to quit would be forcing them to change their belief systems.

There was a lack of significant differences in attitudes towards improving social interaction. One of main motivations for starting to smoke was the social credentials the behavior confers (Ariza & Nebot, 2004; Urberg, Degirmencioglu, & Pilgrim, 1997); however, our results indicate that they are not important when subjects were thinking about quitting. In a study carried out by Jiménez-Muro et al., (2009) there were significant differences regarding the perception of cigarettes as helping in social situations; however, in this case, non-smokers were those who thought it helped. According to our own data, if one expects a smoker to advance in the intention to quit, negative opinions regarding the habit as well as attitudes towards tolerance should be worked on.

Definitively, the variables, opinions, and attitudes towards smoking strengthened the internal constancy towards the TCM stages.

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