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Testing stage effects in an ethnically diverse sample[☆]

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Abstract

The Transtheoretical Model (TTM) has been extensively validated in representative samples of adult smokers. Stage effects, i.e., the patterned relationships between Stage of Change (SOC) and other TTM variables, have been reported in a variety of samples. This study describes reliability data for the TTM variables and tests the stage effects with an ethnically diverse sample of 296 parents with young children. On the basis of theory and previous empirical evidence from a general population, it is possible to make quantitative predications about the magnitude of the expected effect sizes for the Decisional Balance, Situational Temptations, and Processes of Change subscales. For each variable, both a test of significance and a comparison with the expected effect sizes is reported. Results indicated significant stage differences for 8 of the 11 TTM subscales, and all quantitative predictions were confirmed. This study supports the use of TTM measures in an ethnically diverse sample. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Stage of change; Ethnically diverse; Smoking cessation; Effect size predictions

1. Introduction

The Transtheoretical Model (TTM) of Behavior Change (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992; Prochaska & Velicer, 1997; Velicer, Prochaska,

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Fava, Norman & Redding, 1998) has been widely used by researchers to provide both an increased understanding of how behavior change occurs and to help facilitate the process of behavior change. Although the TTM has been studied across a range of behaviors (Prochaska et al., 1994), its initial development was primarily within the area of smoking cessation. Successful behavioral interventions based on the TTM were also initially developed in the area of smoking cessation (Prochaska, DiClemente, Velicer, & Rossi, 1993; Prochaska, Velicer, Fava, Rossi, & Tsoh, in press; Prochaska et al., 2001; Velicer, Prochaska, Fava, Laforge, & Rossi, 1999).

Much of the work to date within smoking cessation has been done with predominantly white populations of average socioeconomic status. It is also important to examine the applicability of the TTM as applied to smoking cessation for populations that are more diverse with respect to both ethnicity and socioeconomic status. Recent research in the area of smoking cessation has begun to extend the application of the TTM for smoking cessation to special populations, such as pregnant smokers (Ruggiero, Tsoh, Everett, Fava, & Guise, 2000). This current study examines the TTM for smoking cessation on another special population, namely an ethnically diverse, lower socioeconomic group of parents of young children.

This group is especially important because it has been found that exposure to passive smoke is significantly more likely among children of lower socioeconomic status compared to those with high socioeconomic status (Mannino, Siegel, Husten, Rose, & Etzel, 1996). Thus, finding measures that apply to this high-risk population is especially important. This study will employ both ordinal and quantitative tests of the hypothesized relationships. Ordinal tests include a test of significance and appropriate follow-up tests that measure the direction of the relationships, $\mu_a > \mu_b$. Quantitative tests go further by investigating the strength of the relationship. Distinctions between ordinal and quantitative predictions are discussed in the predictions section. The quantitative predictions are based on both the TTM and previous empirical results.

1.1. Overview of the TTM

The TTM can be conceptualized as involving three dimensions: the temporal dimension, the independent variable dimension, and the dependent variable dimension (Velicer et al., 1998). The central organizing construct of the model is the temporal dimension, represented by five Stages of Change (SOCs) describing different levels of readiness to quit smoking. The independent dimension is composed of the Processes of Change that act as strategies to bring about change. The dependent dimension is represented by Decisional Balance, Temptations to Smoke, and measures of the target behavior that act as intermediate outcome variables.

1.2. SOCs

The TTM uses the SOCs as an organizing framework. People are classified by their readiness to quit into one of five stages of change for smoking cessation (DiClemente et al., 1991; Velicer, Prochaska, Rossi, & Snow, 1992): Precontemplation (PC), Contemplation (C), Preparation (PR), Action (A), and Maintenance (M). Precontemplators are smoking and not intending to

quit smoking in the next 6 months. Contemplators are smoking but are considering quitting in the next 6 months. People in the Preparation stage are smoking but are planning to quit smoking in the next 30 days and have made a previous quit attempt. People in the Action and Maintenance stages have quit smoking, with those in Action having quit within the last 6 months. These stages have been shown to have predictable relationships with other TTM measures such as Processes of Change, Decisional Balance, and Temptation to Smoke (DiClemente et al., 1991; Fava, Velicer, & Prochaska, 1995; Prochaska & DiClemente, 1983).

1.3. Decisional Balance and Temptation scales

The dependent variable dimension (Velicer, Rossi, Prochaska & DiClemente, 1996) includes a series of intermediate outcome measures, including the Decisional Balance (Velicer, DiClemente, Prochaska & Brandenburg, 1985), the Situational Temptation scales (Velicer, DiClemente, Rossi & Prochaska, 1990), and measures of the target behavior. Typical theories of change involve only a single univariate outcome measure of success, often discrete. Point prevalent smoking cessation (Velicer et al., 1992) is an example from smoking cessation research. Such measures have low power, i.e., limited ability to detect change and are not sensitive to the whole continuum of change. In contrast, the TTM proposes a set of constructs that form a multivariate outcome space and includes measures that are sensitive to progress through all stages and can thus be important complements to discrete cessation outcomes. These constructs include the Pros and Cons from the Decisional Balance Scale, Temptation, and the target behavior. A more detailed presentation of this aspect of the model is provided elsewhere (Velicer et al., 1996).

The Decisional Balance measure originally adapted from Janis and Mann's (1977) work measures both cognitive and motivational aspects of decision making. Cross-sectional studies on a variety of behaviors have found predictable relationships between the Pros and Cons of the Decisional Balance across stages (Prochaska et al., 1994). Precontemplators show higher support of the Pros of Smoking than the Cons. People in the Action and Maintenance stages have reversed their support of these scales, with the Cons now outweighing the Pros. This crossover usually takes place in either the Contemplation or Preparation stages, indicating that people may change their attitudes toward the behavior prior to actually changing their behavior (Prochaska et al., 1994).

Temptation to smoke is a similar construct to Bandura's (1977) concept of self-efficacy. The Temptations construct measures how tempted people are to smoke in different situations rather than how confident they are to not smoke in those situations. Cross-sectional analysis across stage has shown that Temptation to smoke decreases as one moves from Precontemplation to Preparation (Velicer et al., 1990).

1.4. Processes of Change

The TTM also includes a series of independent variables, the Processes of Change (Prochaska, Velicer, DiClemente, & Fava, 1988). The Processes of Change represent strategies for changing one's behavior. The 10 Processes of Change for smoking cessation have a

correlated higher order factor structure and measure change processes that represent two broad dimensions, experiential and behavioral (Prochaska et al., 1988). Experiential processes include consciousness raising, dramatic relief, environmental reevaluation, self-reevaluation, and social liberation. Behavioral processes include stimulus control, counter-conditioning, reinforcement management, self-liberation, and helping relationships.

1.5. Developing quantitative predictions

This paper will report the results of a comparison of smokers who were classified at the baseline assessment into one of the first three SOCs: Precontemplation, Contemplation, or Preparation. Separate analyses of variance (ANOVAs) were performed using stage as the independent grouping variable. The two Decisional Balance subscales, the three Situational Temptations subscales, and six of the 10 Processes of Change served as the dependent variables. In addition to the tests of significance, a series of a priori predictions were made for each analysis where the goal was to verify the predicted effect size for each of the dependent variables.

An emphasis was placed on the magnitude of the effect size rather than solely on statistically significant differences. This represents a shift from the reliance on traditional significance tests (Cohen, 1994). However, significance tests are reported. All effect sizes were calculated as Omega squared (ω^2), the population estimate of the accounted for variance (Maxwell, Camp, & Arvey, 1981). Omega squared is an unbiased estimate of the population effect size and is more appropriate for small samples than other measures of effect size. Effect size interpretations were based on Cohen's (1988) descriptive guidelines. A "small" effect is about 1% of the variance, a "medium" effect is about 6% of the variance, and a "large" effect is about 14% or more of the variance. With this approach, predicting an effect size of zero represents a clear prediction.

Frick (1996) makes an important distinction between ordinal claims and quantitative claims in his discussion about when null hypothesis testing is appropriate in psychological research. Ordinal claims do not specify the size of the effect only the order or direction of the effect. Alternatively, quantitative claims specify the size of the effect. Frick points out that quantitative claims are difficult to make in psychology because effect size differences often do not generalize well across different populations. As a result, knowledge in psychology is mainly based on ordinal claims and we may have to be satisfied with psychology as an ordinal science. In this study, using well-developed measures, an explicit theory, and previous empirical studies, quantitative predictions are a major focus. This is not to say that ordinal claims are not also important, but that quantitative claims can be realistic goals in many domains of psychology. Velicer, Norman, Fava, and Prochaska (1999) present an example of employing quantitative predictions with the TTM for studying stage movement across time.

1.6. Cross-sectional studies of stage relationships

The predictions of the effect size are based on the hypothesized relationships expected based on the TTM and the effect sizes reported in previous studies. Three recent studies have

specifically investigated the relationships between the TTM constructs and the SOC in a variety of samples. DiClemente et al. (1991) utilized a volunteer sample from Texas and Rhode Island. Fava et al. (1995) recruited a representative sample of smokers from Rhode Island. Borland, Segan, and Velicer (in press) reported on the TTM applied to a random sample from Victoria, Australia. These three studies all found support for the predicted stage differences on the TTM constructs. For Decisional Balance, DiClemente et al. found that Pros of smoking significantly decreased and the Cons of smoking significantly increased across SOC. While Fava et al. and Borland et al. (in press) confirmed the significant increase in Cons of smoking across SOC, they found no significant differences for Pros. Both DiClemente et al. and Fava et al. found that Temptations decreased across SOC. In addition, Fava et al. showed that all 10 Processes of Change showed significant increases across the SOC in a representative sample of smokers. Both experiential and behavioral processes were found to rise as one moves through the SOC. DiClemente et al. and Borland et al. (in press) found similar patterns for the majority of the Processes of Change. Estimates of effect size are available for both the DiClemente et al. and Fava et al. studies.¹

1.7. Current study

This study attempted to test the relationships of the TTM constructs across SOC on an ethnically diverse sample. The sample consists of new parents who were enrolled in an intervention study to reduce their children's second hand smoke exposure (Emmons, et al., 2000, 2001).

2. Method

2.1. Participants

The sample consisted of 296 parents of young children recruited for an intervention study aimed at reducing nicotine levels in the home. Participants were recruited through the family practice, obstetrics, and pediatric departments of eight large community health centers that serve diverse, low-income populations. The sample was 91.4% female, had a mean age of 28.4 years, and was ethnically diverse (46.4% White, 18.6% Black, 21.4% Hispanic, and 13.6% other). The mean level of education was 11.3 years with only 20% of the sample reporting more than 12 years of education. Due to the nature of the intervention study, 94% of the sample were smokers, with only 6% recent quitters. Due to the small number of former smokers, they are excluded from further analyses. A complete list of demographic information is given in Table 1.

¹ The estimates of effect size for the DiClemente et al. paper were obtained directly from the authors. Although included in the original manuscript, they were deleted by editorial direction from the published paper.

Table 1
Baseline demographic and smoking history characteristics of the project KISS sample

| Variable | Mean or % |
|--------------------------------------|-------------|
| Age (years) | 28.4 (7.5) |
| Education (years) | 11.3 (2.5) |
| Employed (% yes) | 24.6 |
| Gender (% female) | 91.4 |
| Marital status (%): single parent | 49.5 |
| <i>Race/ethnicity (%)</i> | |
| White | 46.4 |
| Black | 18.6 |
| Hispanic | 21.4 |
| Other | 13.6 |
| <i>Smoking history</i> | |
| Nicotine dependent (%) | 61.3 |
| Smoking rate (cigarettes/day) (mean) | 14.0 (9.3) |
| Years smoked (mean) | 11.8 (7.7) |
| Quit attempts in past year (mean) | 1.7 (6.3) |
| <i>Household characteristics</i> | |
| No. of smokers in household (%) | |
| 1 | 54.3 |
| 2 | 40.2 |
| 3+ | 5.5 |
| No. of people in home (mean) | 3.4 (1.7) |
| No. of rooms in home (mean) | 5.0 (1.3) |
| Months living in home (mean) | 29.8 (56.6) |
| No. children with asthma (mean) | 1.4 (1.0) |

Standard deviations appear in parentheses.

2.2. Measures

2.2.1. Decisional Balance

The Decisional Balance Inventory measures cognitive and motivational aspects of decision making applied to smoking (Velicer et al., 1985). It is composed of two subscales, the Pros and Cons of smoking. The original long form had 20 items and was shown to be a psychometrically reliable and valid measure (Velicer et al., 1985). The current study used the six-item short form of Decisional Balance (Fava, Rossi, Velicer, & Prochaska, 1991) and measured the Pros and Cons of Smoking with three-item subscales. The short form has also been shown to have good reliability and validity (Fava et al., 1991, 1995).

2.2.2. Temptation to Smoke

The Situational Temptation inventory, originally developed by DiClemente, Prochaska, and Gibertini (1985) and further reduced by both Velicer et al. (1990) and Fava et al. (1991), measures temptation to smoke in certain situations. The current study used a nine-item short

form that consists of three subscales measured by three items each: Positive/Social, Negative/Affective, and Habit/Addictive (Fava et al., 1991; Velicer et al., 1990). It has been shown to have good reliability and validity (Fava et al., 1991, 1995).

2.2.3. *Processes of Change*

The original Processes of Change Inventory consists of 40 items measuring 10 subscales of the process of behavior change (Prochaska et al., 1988). Five subscales represent experiential processes of change: Consciousness Raising, Environmental Reevaluation, Self-reevaluation, Social Liberation, and Dramatic Relief. The other five subscales represent behavioral processes: Helping Relationship, Self-liberation, Counter-conditioning, Reinforcement Management, and Stimulus Control. This study used 12 items from the 20-item short form (Fava et al., 1991). This short inventory has been found to be both reliable and valid (Fava et al., 1995). Due to survey length and time limitations only six of the 10 processes were measured: Consciousness Raising, Dramatic Relief, Self-reevaluation, Counter-conditioning Self-liberation, and Stimulus Control. The processes were chosen based on the Fava et al. (1995) study that found these six processes to account for the greatest variance among current smokers, those in Precontemplation, Contemplation, and Preparation. Thus, these processes were felt to have the most promise for intervention purposes across both the experiential and behavioral process domain.

2.3. *Procedure*

Participants were recruited through their health care facility and assigned to either a self-help control intervention or a motivational interview intervention. Participants were contacted at baseline and for 1-, 3-, and 6-month follow-up. The survey was conducted as an interview in either English or Spanish to reduce the impact of literacy on the results. Subjects with other language needs were not eligible for this study. This analysis focuses on data gathered at the baseline assessment. Emmons et al. (2000) and Emmons et al. (2001) provide more information about the study.

3. Results

Subjects were grouped based on SOC. This served as the grouping variable for the analysis and the two Decisional Balance scales, three Situational Temptation scales, and six Processes of Change scales were the dependent variables. The distribution of smokers was 25.4% in Precontemplation, 42.3% in Contemplators, and 32.3% in Preparation.

The 11 TTM scales were first investigated for internal consistency. Coefficient alphas for the six Processes of Change constructs were acceptable for two-item scales and ranged from .60 to .75 with a mean of .66. Coefficient alphas for the Temptations subscales were .75 for Negative/Affective, .71 for Habit/Addictive, and .41 for Positive/Social. The alpha value for the Positive/Social subscale was much lower than previously reported. Coefficient alphas for the three-item Decisional Balance subscales were .67 for the Pros of smoking and .52 for

the Cons of smoking. The homogenous nature of the sample (all smokers) resulted in more attenuated values of the coefficient alpha than have been found with samples representing all stages of change. Coefficient alphas for all subscales along with the correlations between subscales are reported in Table 2.

A multivariate analysis of variance testing for stage differences, including all 11 TTM constructs, was significant, Wilks lambda = 0.64, $F(22,420) = 4.49$, $P < .001$. Follow-up ANOVAs were conducted on all individual TTM subscales, and effect sizes were calculated.

Results indicate significant stage differences for two of the five TTM subscales for Decisional Balance and Temptations (see Table 3). Among these subscales, only the Cons and Negative/Affect scales showed significant stage differences. Post hoc analyses indicate that Precontemplators have significantly lower Cons than those in Contemplation and Preparation. In Fig. 1, the Decisional Balance scales display a typical pattern for the early stages of change for smoking cessation, with the Cons of smoking increasing significantly across stages while the Pros remain constant. The crossover of Pros and Cons occurs between the Contemplation and Preparation stages, which replicates previous studies. The effect size was expected to be zero for the Pros scale and of medium size for the Cons scale. Both predictions were confirmed. For the Negative/Affective Temptations scale, the only significant stage difference was a decrease between Contemplation and Preparation. However, looking at Fig. 1, the pattern of all three scales shows an increase between Precontemplation and Contemplation, then a decrease to Preparation with an overall decrease between Precontemplation and Preparation. The effect size was predicted to be small for these three scales and that prediction was confirmed for all three scales.

Table 2
Reliability of the TTM measures

| TTM subscale | Mean | Standard deviation | Coefficient alpha | Interscale correlations | |
|-------------------------------|-------|--------------------|-------------------|---------------------------------------|------|
| <i>Decisional Balance</i> | | | | Pros | |
| Pros | 8.69 | 3.01 | 0.67 | – | |
| Cons | 8.78 | 3.11 | 0.52 | .06 | – |
| <i>Temptations</i> | | | | Positive/Social Negative/Affective | |
| Positive/Social | 11.30 | 2.98 | 0.41 | – | |
| Negative/Affective | 12.71 | 2.77 | 0.75 | .51* | – |
| Habit/Addictive | 9.79 | 3.48 | 0.71 | .58* | .58* |
| <i>Behavioral processes</i> | | | | SC CC | |
| Stimulus Control | 3.31 | 1.95 | 0.62 | – | |
| Counter-conditioning | 4.53 | 2.19 | 0.70 | .38* | – |
| Self-liberation | 6.41 | 2.41 | 0.75 | .19* | .40* |
| <i>Experiential processes</i> | | | | CR DR | |
| Consciousness Raising | 5.60 | 2.17 | 0.60 | – | |
| Dramatic Relief | 5.47 | 2.30 | 0.66 | .58* | – |
| Self-reevaluation | 5.25 | 2.27 | 0.63 | .51* | .48* |

* $P < .001$.

Table 3
 Decisional Balance, Temptations, and Processes of Change by SOCs for smoking

| | | SOC | | | F value | Tukey HSD | Expected | Effect size observed |
|--|------|------|------|------|---------|-------------|----------|----------------------|
| | | PC | C | PR | | | | |
| <i>Decisional Balance (N = 275)</i> | | | | | | | | |
| Pros | Mean | 50.1 | 50.1 | 49.8 | 0.02 | | None | 0.00 |
| | S.D. | 9.9 | 10.6 | 9.3 | | | | |
| Cons | Mean | 44.8 | 50.9 | 53.2 | 15.38** | PC < C, PR | Medium | 0.101 |
| | S.D. | 9.3 | 9.6 | 10.1 | | | | |
| <i>Situational Temptations (N = 233)</i> | | | | | | | | |
| Habit Strength | Mean | 50.1 | 52.0 | 48.4 | 3.00 | | Small | 0.025 |
| | S.D. | 10.2 | 9.0 | 10.5 | | | | |
| Negative/Affect | Mean | 50.0 | 52.7 | 48.1 | 5.16* | C > PR | Small | 0.043 |
| | S.D. | 9.5 | 9.2 | 10.0 | | | | |
| Positive/Social | Mean | 49.5 | 51.6 | 48.9 | 1.94 | | Small | 0.017 |
| | S.D. | 9.1 | 9.5 | 10.2 | | | | |
| <i>Processes of Change (N = 276)</i> | | | | | | | | |
| Consciousness Raising | Mean | 43.7 | 50.1 | 54.2 | 25.70** | PC < C < PR | Medium | 0.158 |
| | S.D. | 8.4 | 9.3 | 9.7 | | | | |
| Dramatic Relief | Mean | 44.3 | 51.0 | 53.0 | 17.63** | PC < C < PR | Medium | 0.114 |
| | S.D. | 9.7 | 9.7 | 9.1 | | | | |
| Self-reevaluation | Mean | 42.1 | 51.7 | 54.1 | 39.11** | PC < C, PR | Large | 0.221 |
| | S.D. | 7.3 | 9.3 | 9.5 | | | | |
| Stimulus Control | Mean | 45.3 | 49.0 | 54.3 | 19.81** | PC < C < PR | Medium | 0.127 |
| | S.D. | 4.9 | 8.4 | 12.1 | | | | |
| Counter-conditioning | Mean | 46.4 | 48.4 | 54.0 | 15.09** | PC, C < PR | Medium | 0.099 |
| | S.D. | 7.6 | 8.5 | 11.4 | | | | |
| Self-liberation | Mean | 44.2 | 50.2 | 53.7 | 21.06** | PC < C < PR | Large | 0.133 |
| | S.D. | 8.5 | 9.8 | 8.9 | | | | |

Significant Tukey post hoc analyses are listed at the $P < .05$ level.

* $P < .01$.

** $P < .001$.

Table 3 presents the results for the six Processes of Change, all of which showed significant differences across stages. Post hoc analyses investigated the significant stage differences for Processes of Change. The pattern was that Precontemplation was significantly lower than Contemplation and Contemplation was significantly lower than Preparation for all processes. The two exceptions were Self-reevaluation, where the Contemplation–Preparation comparison did not reach significance, and Counter-conditioning, where the Precontemplation–Contemplation comparison did not reach significance. Fig. 1 illustrates these linear increases for the experiential and behavioral processes of change across the stages of change. The effect size was predicted to be medium for Consciousness Raising, Dramatic Relief, Stimulus Control, and Counter-conditioning, and large for Self-reevaluation and Self-liberation. The predictions were confirmed for all six processes.

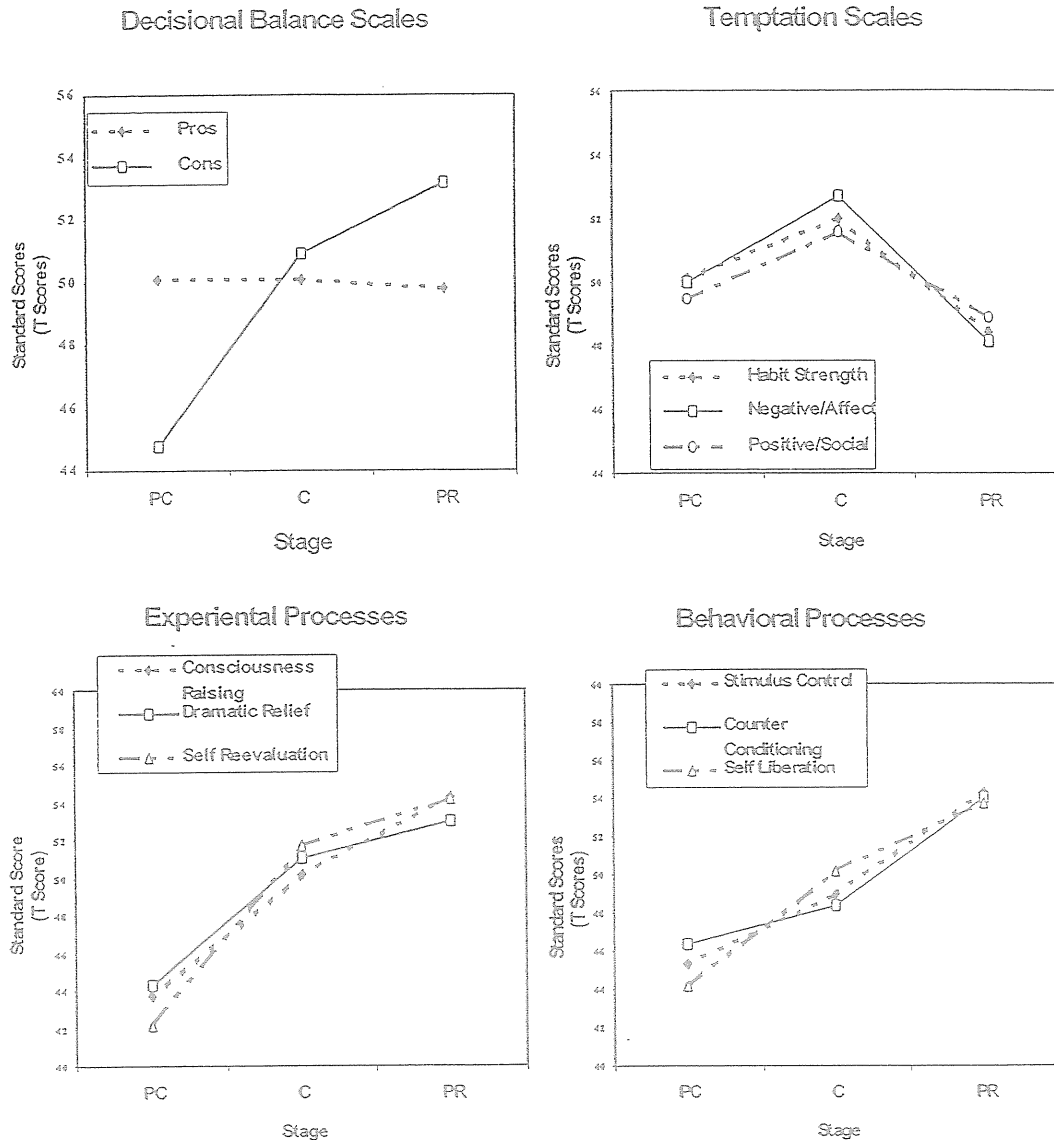


Fig. 1. Decisional Balance, Temptation, and experiential and behavioral process scales across the SOCs.

A multivariate analysis of variance also showed significant stage of change differences for smoking behavior and smoking history measures, Wilks lambda=0.89, $F(8,508)=3.95$, $P<.001$. These measures include: number of cigarettes smoked per day, minutes to first cigarette, number of previous quit attempts in the last year, and age at initiation of smoking. Table 4 gives individual ANOVA results for these measures. The number of quit attempts in the last year and number of cigarettes smoked per day both showed significant stage differences, $F(2,257)=11.86$, $P<.001$ and $F(2,257)=4.34$, $P<.05$,

Table 4
Smoking behavior and smoking history measures by SOCs

| | | SOC | | | <i>F</i> value | Tukey HSD | Effect size |
|---------------------------------|------|------|------|------|----------------|------------|-------------|
| | | PC | C | PR | | | |
| Cigarettes per day | Mean | 13.9 | 15.7 | 11.8 | 4.34* | C > PR | 0.025 |
| | S.D. | 9.3 | 9.5 | 8.5 | | | |
| Minutes to 1st cigarette of day | Mean | 48.5 | 42.6 | 62.5 | 1.47 | | 0.004 |
| | S.D. | 62.4 | 78.5 | 95.8 | | | |
| Quit attempts in past year | Mean | 1.2 | 0.8 | 2.5 | 11.86*** | PC, C < PR | 0.077 |
| | S.D. | 3.8 | 1.3 | 2.5 | | | |
| Age at initiation of smoking | Mean | 15.9 | 16.4 | 17.2 | 1.7 | | 0.005 |
| | S.D. | 3.3 | 5.2 | 4.3 | | | |

Significant Tukey post hoc analyses are listed at the $P < .05$ level.

* $P < .05$.

*** $P < .001$.

respectively. Post hoc analyses show that Contemplators smoke significantly higher numbers of cigarettes per day than those in Preparation, while those in Preparation report a significantly higher number of quit attempts in the past year than both Precontemplators and Contemplators.

4. Discussion

The predicted relationships between the TTM measures and SOC previously reported in other studies were confirmed for this sample of ethnically diverse parents. Decisional Balance showed Pros of Smoking higher than Cons for Precontemplators with a crossover during the Contemplation stage. Processes of Change also showed the predicted pattern across the SOCs. Both behavioral and experiential processes increased across stage. Experiential processes also showed a large gain between Precontemplation and Contemplation. The predicted effect sizes were also confirmed by the observed effect sizes.

While these measures conformed to the predicted pattern, there were a few differences in this sample from those previously reported. First, the distribution across SOC had fewer Precontemplators and more people in Preparation than predicted from previous studies from the United States. Velicer et al. (1995) found consistent proportions of people in each preaction stage (40% Precontemplation, 40% Contemplation, 20% Preparation) across three representative samples. However, our sample has a larger proportion of parents in Contemplation and Preparation. This could be due to the character of the sample, with the majority of the participants being women with young children.

The Temptations measures in our sample also showed differences from previous studies. There was not a linear decline across the stages as usually found for Situational Temptations scales due to the Contemplators having higher scores than those in Precontemplation. However, there was an overall decrease from Precontemplation to Preparation and the overall effect sizes replicated previous studies.

The finding of similar patterns across SOC as found in previous studies, and the strength of those effects support the extension of the TTM measures to an ethnically diverse, low-income sample. Future studies need to compare outcomes of TTM-based interventions on similar populations to further confirm the extension of the TTM to ethnically diverse samples. Additionally, the TTM could be extended to measure stage of readiness to reduce children's exposure to passive smoke, which was the overall goal of the intervention for this sample. This study is only the first step in understanding the possible utility of the TTM for such diverse samples.

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