Associations between the transtheoretical processes of change, nicotine dependence and adolescent smokers’ transition through the stages of change

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ABSTRACT

Aims To examine the significance of the transtheoretical processes of change in predicting transition through the stages of change in adolescent smokers, as well as the relative role of nicotine dependence in predicting stage transitions.

Design In grades 9 and 10, adolescents’ stage of change, the use of processes of change and nicotine dependence were assessed (T1). Stage transitions were assessed 1 year later (T2). Response rate was 73.2%.

Setting Twenty-five secondary schools throughout the Netherlands participated in the present study.

Participants Respondents were 721 adolescents who were classified as smokers at T1 and consequently completed the paper-and-pencil questionnaire at T2.

Measurements Stages of change and processes of change were assessed according to the original transtheoretical measures. Nicotine dependence was measured using a newly developed multi-dimensional scale consisting of 11 items.

Findings Few associations were found between the processes of change and stage transitions. Nicotine dependence contributed significantly to the explanation of adolescents’ transition from preparation to action, after adjustment for processes of change. No evidence for a moderating effect of nicotine dependence in the relation between the processes of change and stage transitions was found.

Conclusions Processes of change do not seem significant in explaining adolescents’ stage transitions. As an alternative for promoting the use of the processes of change for intervention purposes in adolescents, it might be more useful to focus on treating nicotine dependence.

Keywords Adolescents, nicotine dependence, processes of change, smoking cessation, stages of change, transtheoretical model.

INTRODUCTION

The Transtheoretical Model (TTM) [1] is a widely applied and frequently used model to study determinants of smoking cessation, also among adolescents [2–4]. The basis of the TTM is formed by five sequential stages of change [1], which are defined in terms of an individual’s past behaviour and plans for future action. These stages are precontemplation (not planning to quit within 6 months), contemplation (planning to quit within 6 months, but not within the next month), preparation (planning to quit within 1 month and having made a previous quit attempt in the past year), action (having quit within the past 6 months) and maintenance (having quit for more than 6 months).

According to the TTM, movement through the different stages of change is facilitated by 10 processes of change [1,5]. These processes consist of overt and covert activities and experiences in which individuals can engage, in order to attempt to change risk behaviours. The processes of environmental re-evaluation, self-re-evaluation, consciousness raising, social liberation and dramatic relief are thought to be used most frequently during the contemplation and preparation stages of change and have been classified as experiential (cognitive–affective) processes. The processes of reinforcement...
management, counter-conditioning, stimulus control, self-liberation and helping relationship are supposed to occur most frequently during the action and maintenance stages of change and are classified as behavioural processes [1,6] (see Table 1). Theoretically, the processes of change could be used to tailor interventions.

Despite its popularity, however, several concerns about the validity of the TTM have been expressed. One of these concerns is that the stages of change construct might not reflect real stages, but rather segments of an underlying continuum [7]. In addition, the ordering of the stages, the stability of the stages, the classification system to define stages and the qualitative differences of the stages have also been a subject of debate [8,9]. Furthermore, in adults, outcomes regarding the effectiveness of the processes of change in predicting stage transitions or the value of the processes of change as guidelines to tailor smoking cessation interventions have not been convincing [10].

Recently, efforts have been made to assess the psychometric properties of the processes of change in order to validate its use as an assessment tool in adolescent samples [4]. In that study it was concluded that, besides serving as an adequate assessment tool, the processes of change could also be used for intervention purposes in adolescents. Until today, however, the usefulness of the processes of change as concepts to guide intervention development for adolescent smokers has hardly been tested and the impact of the processes of change on stage transitions among adolescents is largely unknown.

The first important goal of the present study is to provide a critical examination of the relations between the TTM’s processes of change and the stage transitions among adolescent smokers using a longitudinal design. It is expected that the experiential processes will be important mainly in predicting forward transitions out of the precontemplation stage and contemplation stage, and that the behavioural processes will be more important in prediction of transitions from preparation into action.

Previously, it has been found that nicotine dependence is an important factor in the process of smoking cessation among adolescents [3,11]. Therefore, our second objective is to examine more closely the role of nicotine dependence, in relation to the processes of change, in predicting adolescent smoking cessation. Based on findings by Farkas and colleagues [12] and Abrams and colleagues [13], demonstrating that variables indicative of addiction are better predictors of abstinence at follow-up than the TTM’s stages and processes of change, we expect that nicotine dependence will be a better predictor of transition into the action stage (i.e. smoking cessation) compared to the processes of change. In addition, because precontemplators are generally more dependent and more likely to continue to smoke despite internal and external environmental influences than contemplators and preparers [14], it is plausible that higher levels of nicotine dependence are associated with fewer efforts to engage in strategies to influence or control the environment, i.e. the processes of change. It is hypothesized therefore that the relation between the processes of change and stage transitions will be stronger for respondents reporting lower levels of dependence.

### Method

#### Procedure and sample

In 2004 [time 1 (T1)] a total of 25 secondary schools participated in the study, resulting in 6750 respondents aged 13–18 years (M = 14.8, SD = 0.88). In 2005 (T2), 4940 respondents were included again (response rate 73.2%) [15]. Students were asked to complete a self-administered written questionnaire, distributed by an instructed teacher during classes in grades 9 and 10 at T1, and grades 10 and 11 at T2. Students were informed that the data would be processed anonymously, i.e. respondent-specific codes were used to link the data from one point in time to the next. Respondents who indicated

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**Table 1** Description of the processes of change.

<table>
<thead>
<tr>
<th>Experiential processes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising (CR)</td>
<td>Increasing knowledge and information about one’s smoking</td>
</tr>
<tr>
<td>Social liberation (SoL)</td>
<td>Awareness, availability and acceptance of alternative, problem-free life-styles in society</td>
</tr>
<tr>
<td>Dramatic relief (DR)</td>
<td>Experiencing and expressing feelings about one’s smoking</td>
</tr>
<tr>
<td>Self-re-evaluation (SR)</td>
<td>Considering feelings and thoughts about the self in relation to one’s smoking</td>
</tr>
<tr>
<td>Environmental re-evaluation (ER)</td>
<td>Considering how smoking affects one’s environment</td>
</tr>
<tr>
<td>Behavioural processes</td>
<td></td>
</tr>
<tr>
<td>Helping relationship (HR)</td>
<td>Trust others and being open about one’s smoking</td>
</tr>
<tr>
<td>Self-liberation (SeL)</td>
<td>Choosing and commitment to act or belief in ability to change</td>
</tr>
<tr>
<td>Counter-conditioning (CC)</td>
<td>Replacing smoking with alternatives</td>
</tr>
<tr>
<td>Stimulus control (SC)</td>
<td>Avoidance or dealing with stimuli that bring out smoking</td>
</tr>
<tr>
<td>Reinforcement management (RM)</td>
<td>Rewarding oneself or being rewarded by others for changing smoking behaviour</td>
</tr>
</tbody>
</table>

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that they had smoked during the past month were labelled as smokers and had to answer questions on smoking demographics, smoking history, smoking behaviour, potential predictors of smoking, etc. A total of 850 of the 4940 respondents (17.2%) indicated at T1 that they had smoked at least once in the past month. Respondents with more than six missing values on the items of either the processes of change or nicotine dependence were excluded, leaving a longitudinal sample of 721 smokers.

Sample characteristics

Of the 721 respondents included in both T1 and T2, 54.5% was female. Moreover, 34.0% received a preparatory vocational training, 16.2% a junior general secondary training, 33.8% a senior general secondary education and 12.8% received a university preparatory training. The mean age at T1 was 15.0 years (SD = 0.84). On average, respondents smoked 32.8 cigarettes per week (SD = 41.2) at T1 and 50.9 cigarettes per week (SD = 45.4) at T2. At T2, 140 respondents reported to have quit smoking.

Measures

Processes of change

The processes of change were assessed by using the original 40-item measure as developed by Prochaska et al. [1,16]. Respondents were asked to indicate their use of the 10 different processes of change (for a description see Table 1). Items could be scored on a five-point scale ranging from 1 (never) to 5 (often), and followed the question: ‘How often did the following occur in the last 4 weeks?’ Reliabilities of the scales were found to be satisfactory, with Cronbach’s alphas ranging from 0.80 to 0.92. Principal factor analysis with oblimin rotation and the number of factors fixed at 10 showed pattern loadings consistent with the TTM’s theory.

Stages of change

The stage of change was assessed using a nine-point ordinal scale ranging from 1 (‘I am planning to quit within the next 10 days’) to 9 (‘I am planning to never quit and not planning to cut down’) [17]. Respondents were categorized into the different stages of change consistent with the approach as described by Prochaska et al. [1,16], i.e. those respondents who agreed to plan to quit within the next month, and who indicated to have made at least one 24-hour quit attempt in the past year, were in preparation, whereas those who agreed to plan to quit within the next 6 months or within the next month without a prior quit attempt in the past year were categorized as in contemplation. All respondents who indicated that they were not planning to quit within the next 6 months were in precontemplation. Respondents indicating to have quit at T2 were categorized into the action stage.

Nicotine dependence

Self-reported nicotine dependence was measured by a newly developed 11-item multi-dimensional scale based on both the modified Fagerström Tolerance Questionnaire (mFTQ) [18] and the Hooked on Nicotine Checklist (HONC) [19]. This scale was validated [20] and Cronbach’s alpha was 0.87.

Attrition analyses

Of the 6750 respondents at T1, 4940 were included again at T2. Respondents lost to follow-up were compared to the remaining respondents on the variables gender, age, education and smoking status using independent-sample t-tests and χ² tests. Analyses showed that respondents lost to follow-up were more likely to be boys [χ²(1, n = 6734) = 16.83; P < 0.001], older (t6691) = 3.89; P < 0.001), to have general secondary training [χ²(3, n = 6581) = 143.38; P < 0.001] and to be smokers [χ²(1, n = 6750) = 33.70; P < 0.001]. A multivariate logistic regression analysis including these independent variables showed all significant associations between these variables and loss to follow-up (Nagelkerke R² = 0.02). These differences can, to a large extent, be explained by the fact that most respondents lost to follow-up were in the last year of a lower educational level at T1, and had graduated at T2 and had therefore left school.

Strategy for analyses

To examine the relation between processes of change and specific stage transitions as specified by the TTM, we applied logistic regression analysis using the software package MPLUS 4.1 [21]. Before applying logistic regression analysis, the missing data in the raw data matrix (with missing data between 1.4 and 4.7%) were estimated with the expectation–maximization (EM) algorithm in SPSS.

To assess the moderating effects of nicotine dependence, we computed product terms of nicotine dependence with each of the 10 processes of change. To avoid multi-collinearity problems, the independent variables were centred before the interaction terms were computed. Logistic regression analyses were performed with the independent variables and the interaction terms in one run.

Because the data have a multi-level structure, the possibility exists that the individual respondents are not independent within schools. To correct for the potential
non-independence (complexity) of the data, the TYPE = COMPLEX procedure in MPLUS is used. This procedure corrects the standard errors of the parameter estimates for dependency leading to unbiased estimates [22].

**RESULTS**

**Stages of change**

At T1, 69.2% of the respondents were classified as precontemplators, 13.0% as contemplators and 17.7% as preparers. At T2, 64.5% of the respondents were classified as precontemplators, 7.0% as contemplators, 8.4% as preparers and 20% of respondents had moved into the action stage. A total of 6.0% (n = 29) of the precontemplators at T1 reported a transition to contemplation at T2, a total of 8.8% (n = 8) of the contemplators at T1 reported a transition to preparation at T2 and 25.8% (n = 32) of preparers at T1 reported a transition to action at T2.

**Processes of change in relation to stages of change**

In line with the TTM we found that, at T1, smokers in the four different stages of change varied in the extent to which they engaged in eight of the 10 processes of change (Table 2). For all processes of change it was found that precontemplators engaged less in the processes compared to contemplators and contemplators less than preparers. Helping relationship and social liberation were the only processes that did not differ between precontemplators, contemplators and preparers. Pearson’s correlations between the 10 processes of change ranged from 0.03 to 0.61 (Table 3), indicating mainly moderate associations between the different processes of change.

**Processes of change in relation to the specific stage transitions**

As shown in Table 4, there were no significant differences in processes of change between precontemplators who progressed to contemplation and precontemplators who...
did not progress to contemplation. With the exception of stimulus control, there were also no significant differences in process use between contemplators who progressed to preparation and contemplators who did not progress to preparation. Counter-conditioning was the only process that differed significantly between preparers progressing to action, compared to preparers who did not progress towards action.

Precontemplation to contemplation

Logistic regression analyses using MPLUS showed none of the processes of change to be related significantly to a forward transition from precontemplation to contemplation (see Table 5). The total variance explained by the processes of change in the transition from precontemplation to contemplation was 5.8%.

Contemplation to preparation

Results of the logistic regression analysis concerning the association between the processes of change and transition from contemplation to preparation were found to be unstable and are therefore not reported. The instability of the outcomes are due most probably to the low number of transitions (n = 8) and the number of independent variables (n = 11) in relation to the observations (n = 91).

Preparation to action

Of the 10 processes of change, one was related significantly to a change from preparation to action, i.e. smoking cessation (Table 5). A greater engagement in counter-conditioning was related to a greater likelihood of smoking cessation 1 year later. The total variance explained by the processes of change in action change was 28.7%.

Contribution of nicotine dependence in addition to the processes of change

Nicotine dependence did not contribute to predicting a transition from precontemplation to contemplation (Table 5). However, nicotine dependence did contribute significantly to predicting a transition from preparation towards action. Having higher levels of nicotine dependence was associated directly significantly with a lower probability of smoking cessation 1 year later. Counter-conditioning also remained significant. By including nicotine dependence in the model the total explained variance increased from 28.7% to 33.7%.

Interaction effects of nicotine dependence

No evidence for a moderating effect of nicotine dependence was found in the relation between the processes of change and the specific transitions as described by the TTM.

Processes of change in relation to general motivation change and behaviour change

Because a limited number of respondents reported to have made a forward stage transition as specified by the

Table 4 Comparison of mean scores on processes of change between progressors and non-progressors.

<table>
<thead>
<tr>
<th></th>
<th>Precontemplation–contemplation</th>
<th>Contemplation–preparation</th>
<th>Preparation–action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>t (df = 482)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>CR</td>
<td>No transition</td>
<td>2.05 (0.93)</td>
<td>−0.75</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>2.18 (0.67)</td>
<td></td>
</tr>
<tr>
<td>SoL</td>
<td>No transition</td>
<td>2.56 (1.01)</td>
<td>−0.31</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>2.62 (0.80)</td>
<td></td>
</tr>
<tr>
<td>DR</td>
<td>No transition</td>
<td>1.67 (0.73)</td>
<td>−0.85</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>1.80 (0.75)</td>
<td></td>
</tr>
<tr>
<td>SR</td>
<td>No transition</td>
<td>1.66 (0.85)</td>
<td>−1.03</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>1.83 (0.93)</td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td>No transition</td>
<td>1.73 (0.94)</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>1.72 (0.88)</td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>No transition</td>
<td>3.46 (1.27)</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>3.37 (1.18)</td>
<td></td>
</tr>
<tr>
<td>SeL</td>
<td>No transition</td>
<td>2.29 (0.95)</td>
<td>−0.06</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>2.31 (0.88)</td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>No transition</td>
<td>1.99 (0.88)</td>
<td>−1.35</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>2.23 (0.91)</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>No transition</td>
<td>1.25 (0.60)</td>
<td>−0.93</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>1.35 (0.61)</td>
<td></td>
</tr>
<tr>
<td>RM</td>
<td>No transition</td>
<td>1.78 (0.93)</td>
<td>−0.91</td>
</tr>
<tr>
<td></td>
<td>Transition</td>
<td>1.93 (0.77)</td>
<td></td>
</tr>
</tbody>
</table>

For abbreviations, see Table 1. *P < 0.05; **P < 0.001.
TTM, it was decided to differentiate additionally between two key aspects of the stages of change construct, i.e. undergoing a motivational change and actually changing behaviour [23]. Respondents who moved forward from precontemplation at T1 to contemplation or preparation at T2, or from contemplation at T1 to preparation at T2 were considered to have undergone a change in motivation \( (n = 67) \). Respondents moving from the precontemplation, contemplation or preparation stage at T1 into the action stage at T2 were considered to have changed their behaviour, i.e. quit smoking \( (n = 140) \). Outcomes regarding the impact of the processes of change on motivation change and behaviour change are consistent with the results reported for the specific stage transitions, namely precontemplation–contemplation and preparation–action. [Aside from the results mentioned for the specific stage transitions it was also assessed whether results would differ when using the hierarchical constructs of experiential processes and behavioural processes in explaining stage transitions as opposed to the 10 separate processes of change. Logistic regression analyses showed no relations between these hierarchical constructs and transitions from precontemplation to contemplation and preparation to action or general motivational changes and behaviour changes. A detailed description of these analyses can be obtained from the first author.]

**DISCUSSION**

This study failed to find strong effects supporting the TTM’s notion that the processes of change are important in facilitating progression towards smoking cessation among adolescents. In addition, it could not be confirmed that experiential processes are more influential in explaining transitions from the precontemplation stage, and that the behavioural processes are more influential in explaining transitions from the preparation stage into action. Our findings are in line with several studies among adults, challenging the importance of the use of these processes in accomplishing motivational or behavioural changes [24–26]. Several explanations have been postulated for the lack of power of the processes of change in predicting subsequent stage progression. One explanation, as discussed in the introduction, is that the stages of change algorithm might not be an adequate measure to capture a person’s motivation to quit [7–9]. One reason mentioned for the lack of validity concerns the seemingly arbitrary cut-off points that are used to classify smokers into the stages of change [7]. Herzog [27] found that adolescent smokers do not seem to think about smoking cessation within the context of fixed time-frames. Moreover, compared to adults, adolescents are less prepared to quit and many adolescents consider it important to quit eventually, but did not consider quitting serious or urgent [2,28]. The construct of motivation to quit in adolescents appears to be different from that in adults, and may therefore require a different approach. It could be reasoned that, because of lower levels of motivation to quit in adolescents, the stages of change construct may require further distinction among precontemplators, as suggested by Dijkstra et al. [29]. This coincides with findings by Herzog & Blagg [30], who compared a variety of items measuring motivation to quit smoking, and found that more than half the precontemplators as defined by the stages of change

### Table 5  Odd ratios (OR) and 95% confidence intervals (CI) of Processes of Change and nicotine dependence on transitions from precontemplation to contemplation and preparation to action.

<table>
<thead>
<tr>
<th></th>
<th>Precontemplation–contemplation ( (n = 484) )</th>
<th>Preparation–action ( (n = 124) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1 ( OR \ (95% \ CI) )</td>
<td>Model 2 ( OR \ (95% \ CI) )</td>
</tr>
<tr>
<td>CR</td>
<td>1.09 (0.76–1.59)</td>
<td>1.10 (0.75–1.61)</td>
</tr>
<tr>
<td>SoL</td>
<td>0.75 (0.49–1.14)</td>
<td>0.75 (0.50–1.21)</td>
</tr>
<tr>
<td>DR</td>
<td>0.91 (0.52–1.58)</td>
<td>0.90 (0.54–1.51)</td>
</tr>
<tr>
<td>SR</td>
<td>1.32 (0.74–2.37)</td>
<td>1.32 (0.73–2.38)</td>
</tr>
<tr>
<td>ER</td>
<td>0.68 (0.35–1.34)</td>
<td>0.68 (0.34–1.34)</td>
</tr>
<tr>
<td>HR</td>
<td>1.27 (0.84–1.93)</td>
<td>1.27 (0.83–1.93)</td>
</tr>
<tr>
<td>SeL</td>
<td>0.90 (0.57–1.42)</td>
<td>0.91 (0.59–1.40)</td>
</tr>
<tr>
<td>CC</td>
<td>1.18 (0.83–1.66)</td>
<td>1.19 (0.84–1.68)</td>
</tr>
<tr>
<td>SC</td>
<td>1.12 (0.64–1.96)</td>
<td>1.10 (0.61–2.00)</td>
</tr>
<tr>
<td>RM</td>
<td>1.13 (0.78–1.64)</td>
<td>1.12 (0.78–1.62)</td>
</tr>
<tr>
<td>Nicotine dependence</td>
<td>1.01 (0.94–1.09)</td>
<td></td>
</tr>
</tbody>
</table>

Model 1 includes the regression analysis with the Processes of Change as independent variables, while model 2 also includes nicotine dependence as an independent variable. For abbreviations, see Table 1. *\( P < 0.01 \), **\( P < 0.001 \).
were contemplating cessation and many precontemplators intended to quit. Because intention to quit in adolescents does not appear to be measured optimally by assessing specific plans, it is conceivable that indicators of intention to quit for this specific group should be focusing more on insubstantial plans, for example assessing to what extent one is planning to quit immediately, soon, somewhere in the future, or not at all. A combination measure of this type may be more appropriate to evaluate adolescents’ plans to quit.

The present study found support for the hypothesis that nicotine dependence contributes significantly to the explanation of adolescents’ smoking cessation, while adjusting for the processes of change. This finding is in line with studies among adults suggesting that variables indicative of addiction may make better predictors of abstinence at follow-up, compared to the processes of change and variables indicative of motivation and intention to change behaviour [12,13].

An interesting finding was the absence of an interaction between the processes of change and nicotine dependence in explaining stage transitions. Irrespective of adolescents’ level of nicotine dependence, the relationship between the processes of change and stage transitions remains limited indicating that, with the exception of counter-conditioning, the utilization of the processes of change strategies are ineffective in changing adolescent smoking behaviour.

In our opinion, instead of focusing upon influencing strategies such as the processes of change, future research and intervention development should focus more upon the specific role of dependency and habitual factors in adolescents’ process of smoking cessation. Among adults, nicotine replacement therapy (NRT) has proved to be an important smoking cessation adjunct. The use and efficacy of NRT in adolescents has, however, hardly been investigated [31] and is somewhat controversial [32]. Nevertheless, considering that within this and other studies [3,11], nicotine dependence was found to be a strong predictor of smoking cessation: clinical trials regarding the safety, feasibility and efficacy of NRT use in lowering levels of dependence in adolescents seem warranted.

Some limitations of the present study should also be addressed. First, because adolescent self-reports to assess their smoking status were used which were not validated biochemically, the possibility of under- or over-reporting exists [33]. Several studies among adolescents have, however, assessed self-reported smoking and quitting behaviour to be valid and reliable [34,35]. Secondly, because of the relatively small proportion of respondents making the specific stage transitions as described by the TTM, it is difficult to evaluate how well the findings of this study are generalizable to the adolescent smoking population at large. However, analysing the association between the processes of change and a general motivation change and a change towards action also resulted in few significant associations. It has been argued by some that the distinction between a motivational and volitional stage is the key contribution of a stage model [36]. If processes of change would indeed be important catalysts of progression towards cessation, relations between the processes of change and both motivation change and behaviour would certainly be expected.

A final limitation might be the interval between the measurement waves. It is possible that the relation between the processes of change and stage progression is intermediate and cannot be detected adequately using a design with a 1-year interval follow-up [24]. Herzog et al. [37] revealed, however, that when motivation to quit was measured by using a contemplation ladder, as opposed to the stages of change, processes of change did predict increases from lower levels to higher levels of motivational readiness to quit at a 1-year follow-up. These results suggest that processes of change might be useful indicators of increases in motivation to quit if the stages of change are not used as the measure of motivation to quit.

To conclude, the TTM has been extremely influential in the adult smoking cessation field [24], and is now also finding its way into adolescent smoking cessation research. Although it would be premature to denounce completely the importance of the processes of change in explaining smoking cessation, it is important to note that the critical assumption that the processes of change guide the process towards smoking cessation has not been supported adequately by several prospective studies. This is the first time that the relations between processes and stages of change and smoking cessation have been studied in a nation-wide prospective, relatively large sample of juvenile smokers. Although adolescents report engaging, to some extent, in the cognitive and Behavioural processes of change, these processes do not seem to play an important role in progression towards cessation. Our findings indicate that, as an alternative for promoting the use of the processes of change for intervention purposes in adolescents, it might be more useful to focus on the treatment of nicotine dependence.

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