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**DOI**

[10.1037/adb0000281](https://doi.org/10.1037/adb0000281)

**Publication date**

2017

**Document Version**

Final published version

**Published in**

Psychology of Addictive Behaviors

**License**

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[Link to publication](#)

**Citation for published version (APA):**

Meijer, E., van Laar, C., Gebhardt, W. A., Fokkema, M., van den Putte, B., Dijkstra, A., Fong, G. T., & Willemsen, M. C. (2017). Identity change among smokers and ex-smokers: Findings from the ITC Netherlands survey. *Psychology of Addictive Behaviors*, 31(4), 465-478. <https://doi.org/10.1037/adb0000281>

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# Identity Change Among Smokers and Ex-Smokers: Findings From the ITC Netherlands Survey

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Successful smoking cessation appears to be facilitated by identity change, that is, when quitting or nonsmoking becomes part of smokers' and ex-smokers' self-concepts. The current longitudinal study is the first to examine how identity changes over time among smokers and ex-smokers and whether this can be predicted by socioeconomic status (SES) and psychosocial factors (i.e., attitude, perceived health damage, social norms, stigma, acceptance, self-evaluative emotions, health worries, expected social support). We examined identification with smoking (i.e., smoker self-identity) and quitting (i.e., quitter self-identity) among a large sample of smokers ( $n = 742$ ) and ex-smokers ( $n = 201$ ) in a cohort study with yearly measurements between 2009 and 2014. Latent growth curve modeling was used as an advanced statistical technique. As hypothesized, smokers perceived themselves more as smokers and less as quitters than do ex-smokers, and identification with smoking increased over time among smokers and decreased among ex-smokers. Furthermore, psychosocial factors predicted baseline identity and identity development. Socioeconomic status (SES) was particularly important. Specifically, lower SES smokers and lower SES ex-smokers identified more strongly with smoking, and smoker and quitter identities were more resistant to change among lower SES groups. Moreover, stronger proquitting social norms were associated with increasing quitter identities over time among smokers and ex-smokers and with decreasing smoker identities among ex-smokers. Predictors of identity differed between smokers and ex-smokers. Results suggest that SES and proquitting social norms should be taken into account when developing ways to facilitate identity change and, thereby, successful smoking cessation.

**Keywords:** identity change, socioeconomic status, psychosocial factors, smokers, ex-smokers

**Supplemental materials:** <http://dx.doi.org/10.1037/adb0000281.supp>

This article was published Online First May 11, 2017.

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Financial support for this research was provided by the Netherlands Organization for Health Research and Development (Grants 121010008, 200130002, and 70000001).

Findings using the same data were presented at the 2015 European Health Psychology Society Conference, Limassol, Cyprus, on a poster titled "Predicting Changes in Smoker Identity and Quitter Identity Among Smokers and Ex-smokers Using ITC Data." This poster presented results of linear regression analyses predicting strength of identity from predictors measured 1 year earlier.

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Identity is important for smoking behavior (e.g., Lindgren, Neighbors, Gasser, Ramirez, & Cvencek, 2016). Previous work suggests that identity change facilitates successful quitting (Tombor, Shahab, Brown, Notley, & West, 2015), but it is less clear how smokers and ex-smokers come to see themselves more as a quitter or nonsmoker and less as a smoker. The current study is the first to examine whether socioeconomic status (SES) and psychosocial factors are associated with changes in identification with smoking (i.e., smoker self-identity) and quitting (i.e., quitter self-identity) among smokers and ex-smokers.

PRIME theory states that people are more likely to engage in behavior that they perceive as fitting with who they are (West, 2006). In addition, the social identity approach states that people may derive their identity from their memberships in social groups (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). People are likely to behave in line with the social norms of the groups that they strongly identify with (Tajfel & Turner, 1979, 1986). Previous work showed that identity is related to smoking behavior, even when controlling for other important influences. Specifically, controlling for other important factors, smokers who identify with quitting, nonsmoking, or the group of nonsmokers are more likely to quit smoking successfully, whereas smokers who identify with smoking or the group of smokers are less likely to quit successfully (e.g., Hertel & Mermelstein, 2012; Høie, Moan, & Rise, 2010; Meijer, Gebhardt, Dijkstra, Willemsen, & Van Laar, 2015; Meijer, Gebhardt, Van Laar, Kawous, & Beijck, 2016; Meijer et al., 2017; Moan & Rise, 2005, 2006; Tombor et al., 2013; van den Putte, Yzer, Willemsen, & De Bruijn, 2009). Also, when effects are directly compared, quitter and nonsmoker identities are more important for smoking cessation than are smoker identities (Meijer et al., 2015, 2016, 2017). As such, for smokers, possible selves as quitters appear more important for quitting than current selves as smokers. Furthermore, some evidence suggests that smokers from lower SES backgrounds may have more difficulty picturing themselves as nonsmokers (Meijer et al., 2015), although this has not yet been replicated (Meijer et al., 2016, 2017).

Identity is not only relevant in the period before a quit attempt but continues to change after successful smoking cessation, such that ex-smokers come to perceive themselves more as nonsmokers and move away from their previous identity as smokers (Brown, 1996; Luck & Beagan, 2015; Shadel, Mermelstein, & Borrelli, 1996; Vangeli & West, 2012). Stronger identification with nonsmoking is associated with continued abstinence (Tombor et al., 2015). On the other hand, ex-smokers may also retain a smoker identity, which may motivate relapse (Nachtigal & Kidron, 2015; Vangeli, Stapleton, & West, 2010; Vangeli & West, 2012). One study showed that 53% and 16% of ex-smokers had a residual identity as a smoker after one and two years of abstinence, respectively (Vangeli et al., 2010), suggesting suggests that duration of behavior (e.g., smoking) may be important for identity strength.

In sum, previous studies showed that identity changes occur as part of the process of quitting smoking and appear to facilitate successful quitting. Therefore, it is important to know what factors instigate identity change and how nonsmoking can become increasingly integrated into the self-concept following a quit attempt. However, to our knowledge, only one study has investigated psychosocial correlates of smoker self-identity change, but this study focused on adolescent smokers (Hertel & Mermelstein, 2016). Importantly, identity change processes are likely to be

different before and after a quit attempt. Whereas smokers may intend to quit and may identify with being a quitter as a possible self (Barreto & Frazier, 2012; Markus & Nurius, 1986), they do not yet engage in the behavior of quitting smoking. On the other hand, the identity as a quitter corresponds with ex-smokers' nonsmoking behavior. The current study therefore examines which factors predict change in smoker and quitter self-identity among smokers and ex-smokers. In the following, we will first summarize the scarce research on predictors of identity change in the process of successfully quitting smoking and discuss relevant theories on identity change.

### Potential Correlates of Change in Smoking-Related Identities

The only study that directly examined correlates of identity change in smokers focused on adolescent smokers (Hertel & Mermelstein, 2016) and showed that smoker self-identities increased as smokers became more inclined to smoke in order to cope with negative emotions (motive for smoking). Furthermore, findings of other studies (not focused on correlates of identity change) shed some light on factors that may be associated with change from a smoker identity to becoming a nonsmoker. Identity change may be initiated by negative self-evaluative emotions (e.g., shame) and perceived stigma about being a smoker (Luck & Beagan, 2015). Furthermore, changes in identities relevant to smoking are likely to be associated with changes in attitudes toward quitting and smoking (Bottorff, Johnson, Irwin, & Ratner, 2000; Brown, 1996; Luck & Beagan, 2015). Moreover, social support facilitated identification with nonsmoking among older smokers who quit (Brown, 1996). Finally, identity change toward becoming a nonsmoker is likely to be more difficult for smokers who have more smokers in their social networks (Bottorff et al., 2000; Gibbons & Eggleston, 1996; Luck & Beagan, 2015). In sum, previous work suggests that several psychosocial factors may play a role in smoking-related identity change: motives for smoking, negative self-evaluative emotions, perceived stigma, attitudes, social support, and the number of smokers in the social network.

### Identity Change Theories

Several theories have been developed to explain changes in self-identity and group-identity more broadly. Adopting a self-identity perspective, both identity shift theory (Kearney & O'Sullivan, 2003) and identity control theory (Burke, 2006) propose that identity change is initiated by conflict. Specifically, identity shift theory suggests that accumulating evidence of conflict between behavior (e.g., smoking) and values (e.g., living healthily) may initiate identity change and suggests that subsequent changes in identity affect, and are effected by, behavior change. However, smokers may also use rationalizations to justify identity conflict (Hoek, Maubach, Stevenson, Gendall, & Edwards, 2013). Identity control theory emphasizes conflict between meanings of two identities (e.g., smoker and parent) or conflict between an identity and self-relevant meanings in a situation (e.g., being a smoker and becoming pregnant) as initiators of identity change processes. People are then motivated to change the meaning of an identity to make it more compatible with another more important identity or with self-relevant meanings of the situation. For example, a pregnant smoker may come to perceive her identity as a

smoker in less negative terms in order to decrease conflict with her identity as a mother (e.g., perceiving her smoking as actually being positive because of her belief that quitting during pregnancy would cause stress that harms the unborn child).

Regarding group-identity, the social identity model of cessation maintenance (SIMCM; Frings & Albery, 2015) and the social identity model of recovery (SIMOR; Best et al., 2015) focus on identity change in recovery from addiction, and state that the social environment (i.e., therapeutic group or social network, respectively) plays a central role. The SIMCM emphasizes the importance of accessibility of identities, reasoning that people may hold multiple identities of which only those that are accessible in a specific situation are likely to affect behavior (cf. Wheeler, DeMarree, & Petty, 2007). According to the SIMCM, therapeutic groups may facilitate stronger identification with recovery by increasing the accessibility of recovery identities (i.e., self-perception as someone in recovery from addiction), being a source of self-esteem and self-efficacy to stay abstinent, providing social support and discouraging relapse (Frings & Albery, 2015). Furthermore, the SIMOR (Best et al., 2015) states that people who are in recovery from addiction and identify with social groups that favor recovery will internalize the group's norms and values. The new social identity and its associated norms will then guide their behavior, until the recovery identity is rooted in self-conceptualization and social norms become less important for behavior.

### Current Study

The current study extends previous work and examines change and psychosocial predictors of change in smoker and quitter self-identity among continuing smokers as well as ex-smokers. On the basis of indications from previous research regarding potential relevant factors, we included SES (Meijer et al., 2015), attitudes (Bottorff et al., 2000; Brown, 1996; Luck & Beagan, 2015), self-evaluative emotions (Luck & Beagan, 2015), stigma (Luck & Beagan, 2015), perceived social norms (Best et al., 2015; Bottorff et al., 2000; Gibbons & Eggleston, 1996; Luck & Beagan, 2015), and social support for quitting (Brown, 1996; Frings & Albery, 2015) as predictors of identity change. Motives for smoking (Hertel & Mermelstein, 2016) were not measured in the current data set. In addition, in line with identity shift theory, stating that accumulating evidence of conflict between behavior and values may precede identity change (Kearney & O'Sullivan, 2003), perceived health damage, health worries, and acceptance of smoking were included. Latent growth curve modeling was used to model and predict identity change, and the models were cross-validated to assess generalizability beyond the initial sample. To the best of our knowledge, this is the first large-scale exploration of psychosocial predictors of change in smoker and quitter self-identity among adult smokers and ex-smokers. We aimed to answer the following research questions (RQ):

1. Do smoker and quitter self-identity differ between smokers and ex-smokers at baseline (RQ1a)? Do smoker and quitter self-identity develop over time in smokers and ex-smokers (RQ1b), and do changes in smoker and quitter self-identity differ between smokers and ex-smokers (RQ1c)? We hypothesized that smoker self-identity will

be stronger, and quitter self-identity will be weaker at baseline (i.e., intercept) among smokers than among ex-smokers. Also, we hypothesized that smoker self-identity will increase over time in smokers (i.e., positive slope), whereas it will decrease in ex-smokers (i.e., negative slope) and that quitter self-identity will decrease (i.e., negative slope) among smokers and increase among ex-smokers (i.e., positive slope).

2. Are changes in smoker and quitter self-identity predicted by SES and psychosocial factors (RQ2)? We hypothesized that stronger smoker self-identity at baseline (i.e., higher intercepts) and increases in smoker self-identity over time (i.e., positive slopes) are predicted by lower SES, stronger positive attitude toward smoking, stronger negative attitude toward quitting, weaker negative self-evaluative emotions about smoking, less perceived health damage, weaker health worries, stronger prosmoking and weaker proquitting perceived social norms, weaker expected social support for quitting, weaker stigma of the typical smoker (i.e., own perception and perceived societal stigma), and stronger acceptance of smoking (i.e., own perception and perceived societal acceptance). Regarding quitter self-identity, we expected these associations to be in the opposite direction, such that, for example, higher SES would be associated with stronger baseline quitter self-identity and increased quitter self-identity over time.
3. Do associations between SES and psychosocial factors and smoker and quitter self-identity differ between smokers and ex-smokers (RQ3)?
4. How well do the models generalize beyond the initial sample (RQ4)?

## Method

### Participants

This study is part of the International Tobacco Control Policy Evaluation Project ([www.itcproject.org](http://www.itcproject.org); Fong et al., 2006). We used data from the International Tobacco Control (ITC) Netherlands Survey, a longitudinal cohort study which started in 2008. The data used for the current study were collected in the Netherlands from 2009 to 2014 (henceforth referred to as Waves 1 through 6, respectively). Participants were aged 16 or older and were smokers or ex-smokers at enrollment. Participants who smoked at least monthly and had smoked at least 100 cigarettes in their lifetime were considered smokers, and those who had smoked monthly and had smoked at least 100 cigarettes but were now abstinent were considered ex-smokers. Participants could participate in subsequent waves regardless of smoking status and could also continue their participation if they had not participated in a previous wave. Participants who dropped out of the study were replaced, from the same sampling frame, in order to maintain sample size. Surveys were administered online or by telephone by the research firm TNS NIPO (see Table 1 in the online supplemental material for participant flow). The ITC Netherlands Sur-



veys were cleared for ethics by the Human Research Ethics Committee of the University of Waterloo. The sample at each wave is representative of the Dutch smoking population (Nagelhout et al., 2010, 2016).

**Initial analyses.** For the initial analyses, we used data that were collected annually between 2012 and 2014 (Waves 4 through 6). Given changes in antismoking regulation in the Netherlands over time (i.e., the smoking ban in hospitality venues was reversed for small pubs in 2010), these data were considered more relevant than less recent data. The findings were cross-validated using less recent data from Waves 1 through 3 (see the following text). Wave 4 had 2,022 participants (1,604 smokers), Wave 5 had 1,970 participants (1,531 smokers) and Wave 6 had 2,008 participants (1,569 smokers). Participants with full data for smoker or quitter self-identity at the three waves were included in the respective analyses ( $n = 943$  and  $n = 869$  for smoker and quitter self-identity, respectively; see Table 2A in the online supplemental material for attrition analyses). We first fitted models among continuing smokers only because a number of relevant covariates were not measured among ex-smokers and could therefore not be examined in multiple-group models (i.e., models that include and compare smokers and ex-smokers).<sup>1</sup> In addition, we performed multiple-group analyses to compare continuing smokers and ex-smokers, using covariates that were measured in both groups (see statistical analyses). For this purpose, the sample was divided into participants who smoked at Waves 4 through 6 (i.e., continuing smokers;  $n = 742$  and  $n = 674$  for smoker and quitter self-identity, respectively) and participants who were ex-smokers at Waves 4 through 6 (i.e., continuing ex-smokers;  $n = 201$  and  $n = 195$  for smoker and quitter self-identity, respectively). Of the smokers included in the models, 183 (25%) and 206 (28%) attempted to quit (unsuccessfully) between Waves 4 through 5 and 5 through 6, respectively. Of the ex-smokers included in the models, 14 (7%) and 6 (3%) relapsed and quit smoking again between Waves 4 and 5 and 5 and 6, respectively (see Table 3 in the online supplemental material for more information on background and smoking characteristics).

**Cross-validation.** We cross-validated the models using data from 2009 to 2011 (Waves 1 through 3), with 2,012 participants at Wave 1 (1,763 smokers), 2,060 participants at Wave 2 (1,723 smokers), and 2,101 participants at Wave 3 (1,672 smokers). Again, participants with full smoker and quitter self-identity data were included in the respective models ( $N = 721$  and  $N = 679$  for smoker and quitter self-identity, respectively; see Table 2B in the online supplemental material for attrition analyses). The sample contained 651 and 611 continuing smokers and 70 and 68 ex-smokers for smoker and quitter self-identity, respectively. Of those included in the smoker and quitter self-identity cross-validation samples, 291 (40%) and 265 (39%) participants had also been part of the initial samples. See Table 3 in the online supplemental material for background and smoking characteristics.

## Measures

Measures that were included in current analyses are described in the following text. For variables with multiple items, scales were constructed by averaging scores on the individual items, unless indicated otherwise.

**Identity outcome measures.** Outcome measures were measured between 2012 and 2014 (initial analyses) and 2009 and 2011 (cross-validation). Variables were recoded such that higher scores indicated stronger identities.

**Smoker self-identity.** Smoker self-identity was measured with the following two items: “To continue smoking would fit with who you are” and “To continue smoking would fit with how you want to live” for smokers, and “To start smoking again would fit with who you are” and “To start smoking again would fit with how you want to live” for ex-smokers, with answers ranging from 1 (*strongly agree*) to 5 (*strongly disagree*;  $r = .82, .86, \text{ and } .86$  at Waves 4, 5, and 6, respectively). Smoker self-identity was missing for 93, 127, and 53 participants at Waves 4, 5, and 6, respectively.

**Quitter self-identity.** Similarly, quitter self-identity was measured with two variables, for example, “To quit smoking (smokers)/stay quit (ex-smokers) within the next 6 months would fit with who you are,” with answers ranging from 1 (*strongly agree*) to 5 (*strongly disagree*;  $r = .83, .84, \text{ and } .85$  at Waves 4, 5, and 6, respectively). Quitter self-identity was missing for 167, 233, and 149 participants at Waves 4, 5, and 6, respectively.

**Covariates.** Covariates were measured at Wave 4 for the initial analyses (see Table 4 in the online supplemental material for descriptive statistics and missing values) and at Wave 1 for cross-validation. Higher scores indicated that participants were higher on the concepts. For all models, the number of missing values in the covariates was well below 5%.

## Covariates Measured Among Smokers and Ex-Smokers

**SES.** Highest attained educational level was used to measure SES (cf. Schaap, van Agt, & Kunst, 2008). Answer categories ranged from 1 (*no degree*) to 7 (*university master*), and 8 (*do not know/do not want to say*; recoded as missing). SES was converted into two dummy variables, representing middle SES (middle prevocational education, secondary education second stage) versus lower SES (no degree, lower prevocational secondary education), and higher SES (senior general secondary education and preuniversity education, higher professional education and university bachelor, university master) versus lower SES.

**Attitude.** Attitude toward smoking and attitude toward quitting were measured with one item each, which are “What is your overall opinion on smoking?” and “If you quit smoking within the next 6 months (for smokers)/If you stay quit (for ex-smokers), this would be . . .”, with answer categories ranging from 1 (*very positive*) to 5 (*very negative*). As such, higher scores indicated more negative attitudes and lower scores indicated more positive attitudes.

**Perceived health damage.** Health damage was measured with one item, which is, “To what extent has smoking damaged your health?” with answer categories ranging from 1 (*not at all*) to 4 (*a great deal*).

**Perceived social norms.** Prosmoking social norms were measured with one item, which is, “People think you should not

<sup>1</sup> In latent growth curve modeling the term ‘covariate’ is used to indicate predictor variables, and should not be confused with covariates in analysis of covariance.

smoke” with answers ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). Proquitting social norms were measured with one item, which is, “Thinking about the people who are important to you, how do you think most of them would feel about you quitting smoking (smokers)/staying quit (ex-smokers) within the next 6 months?”, with answers ranging from 1 (*strongly disapprove*) to 5 (*strongly approve*).

**Stigma.** Own stigma ( $\alpha = .75$ ) and perceived stigma ( $\alpha = .74$ ) were measured with five items each (i.e., nice, determined, free, persistent, pathetic [recoded]); for example, “To what extent do you (own stigma)/people in the Netherlands (perceived stigma) think of smokers as nice?” with answers ranging from 1 (*very nice*) to 7 (*not at all nice*).

**Acceptance of smoking.** Own acceptance of smoking ( $\alpha = .74$ ) and perceived acceptance of smoking ( $\alpha = .73$ ) were measured with five items each (i.e., on the street, in a pub, in a restaurant, in the presence of children, in a car with nonsmokers); for example, “To what extent do you (own acceptance)/people in The Netherlands (perceived acceptance) accept it when someone smokes in a pub?”, with answers ranging from 1 (*very unacceptable*) to 5 (*very acceptable*).

### Covariates Measured Among Smokers

**Self-evaluative emotions.** Self-evaluative emotions about smoking were measured with three items (i.e., hate, blame, angry); for example, “You are angry with yourself because you smoke,” with answers ranging from 1 (*strongly agree*) to 5 (*strongly disagree*;  $\alpha = .89$ ).

**Self-evaluative emotions (outside).** Self-evaluative emotions when smoking outside were introduced as follows: “On the first of July 2008, the hospitality industry became smoke-free. That means that you can only smoke inside if there is a special smoking room. In most cases you will have to smoke outside. How do you feel when you are smoking outside?” Self-evaluative emotions when smoking outside as a consequence of the Dutch smoking ban in hospitality venues were measured with five items; for example, “You’re unhappy with yourself for smoking,” with answers ranging from 1 (*strongly agree*) to 5 (*strongly disagree*;  $\alpha = .89$ ).

**Health worries.** Health worries were measured with one item, which is, “How worried are you, if at all, that smoking will damage your health in the future?”, with answer categories ranging from 1 (*not at all worried*) to 4 (*very worried*).

**Expected social support.** Expected social support for quitting smoking was measured with two items, which are, “Suppose that you would like to quit smoking. How supportive do you think your spouse or partner (Item 1)/friends and members of your family (Item 2) would be?” Answer categories ranged from 1 (*very supportive*) to 4 (*not at all supportive*). An average score was calculated when at least one item was answered ( $r = .58$ ).

**Cigarettes per day.** Participants were asked whether they smoked daily, at least weekly, or at least monthly, and how many cigarettes they smoked on average per day, week, or month, respectively. For each participant, the average number of cigarettes smoked per day was calculated.

### Statistical Analyses

The analyses were performed in several steps. The initial analyses were performed using data from Waves 4 through 6, and data

from Waves 1 through 3 were used for cross-validation. We first fitted two models for smoker self-identity (Model 1) and quitter self-identity (Model 2) among continuing smokers only (i.e., smokers at Waves 4 through 6), using the additional covariates that were measured only among smokers and not among ex-smokers. Second, we fitted two multiple-group models among continuing smokers and continuing ex-smokers (i.e., ex-smokers at Waves 4 through 6) for smoker self-identity (Model 3) and quitter self-identity (Model 4). Each of these four models was estimated in two steps, that is, we first fitted a latent growth curve model without covariates (Step 1; RQ1) and then added the covariates to predict baseline and growth (Step 2; RQ2). Covariates were centered to facilitate the interpretation of intercepts and slopes (see Table 5 in the online supplemental material for means and (co)variances of latent intercepts and slopes). We also performed multiple-group analyses in Model 3 and 4 to compare smokers and ex-smokers (RQ3). The four final models were then cross-validated using data from Waves 1 through 3 (Step 3; RQ4).

Analyses were performed in R (R Core Team, 2014), using the growth function of the lavaan package Version 0.5–20 (Rosseel, 2012). We used robust maximum likelihood estimation because not all variables were normally distributed. Transformation of variables was therefore not required (Enders, 2001). In addition, full information maximum likelihood was used because some covariates had missing values. We therefore did not perform attrition analyses. For the remainder, default settings of the lavaan growth function were used.

**Smokers subsample (Models 1 and 2).** Latent growth curve models without covariates were fitted using data from Waves 4 through 6 for smoker self-identity (Model 1) and quitter self-identity (Model 2) separately (RQ1). The models contained freely estimated means of the intercept and slope, variances of the intercept and slope, covariances between intercept and slope, and residual variances.<sup>2</sup> We examined significance of model parameters and examined chi-square, comparative fit index (CFI), root mean square error of approximation (RMSEA), standardized root mean residual (SRMR), and Akaike information criterion (AIC) to assess model fit. Chi-square, CFI and RMSEA values were robust values (SRMR and AIC are not corrected when robust estimation is used). Nonsignificant model chi-square values indicate that the model does not deviate significantly from the data, although chi-square values are often significant in large samples. In addition, according to Hu and Bentler (1999), CFI values  $\geq .95$ , SRMR values  $\leq .08$ , and RMSEA values  $\leq .06$  indicate good model fit.

Second, we added SES and psychosocial variables (measured at Wave 4) to predict the intercepts and slopes of smoker (Model 1) and quitter self-identity (Model 2; RQ2). Third, the models with covariates were cross-validated using data from Waves 1 through 3 to establish generalizability of the findings. We examined fit indices as well as model parameters to compare the cross-validated results to the initial results (RQ4).

**Multiple-group analyses (Models 3 and 4).** Again, the multiple-group analyses were performed in three steps for smoker (Model 3) and quitter self-identity (Model 4) separately. First, latent growth curve models without covariates were fitted on

<sup>2</sup> We estimated a linear slope, which means that the development in identity is the same between Wave 4 and 5 and Wave 5 and 6.

Waves 4 through 6 (RQ1), and then multiple-group analyses were performed for smokers and ex-smokers (RQ3). We started with the most complex model without any equality restrictions between groups. In line with the smokers-only analyses, this model contained freely estimated model parameters (multiple-group Model 0; MG0). We then applied between-groups equality restrictions on the intercept variances (MG1), slope variances (MG2), intercept/slope covariances (MG3), residual variances of manifest identity variables (MG4), mean intercept (MG5) and mean slope (MG6). As these models were nested, we used chi-square difference tests and AIC to examine whether model fit decreased significantly with more restrictive models, compared with the previous less restrictive model with adequate fit. Models were retained when chi-square difference tests yielded nonsignificant results. When the chi-square difference was marginally significant ( $p < .10$ ) the more restrictive model was also rejected. Furthermore, models with lower AIC values were taken to be better-fitting.

Second, latent growth curve multiple-group models with covariates (MGC) were fitted with SES and psychosocial variables as time-invariant covariates, based on the best fitting model without covariates (RQ2). We fitted a baseline model without any between-groups equality restrictions on regression weights (i.e., configural invariance; MGC0) and then restricted regression weights to be equal across smokers and ex-smokers. We assessed model fit as we did for the models without covariates. Third, we cross-validated the final models for smoker (Model 3) and quitter self-identity (Model 4) using data from Waves 1 through 3 (RQ4).

## Results

### Preliminary Analyses

Bivariate correlations showed that both smoker and quitter self-identity were strongly and positively correlated between time points among smokers (see Table 1; see Table 6 in the online supplemental material for correlations with covariates), suggesting that identity strength was relatively stable over time. Among ex-smokers, medium-sized and positive correlations were found between measurements one year apart (i.e., Waves 4 and 5, Waves 5 and 6), but (as might be expected) correlations between Wave 4 and 6 were weaker for both smoker and quitter self-identity.

Furthermore, mean scores suggested that smoker self-identity increased slightly among smokers and decreased slightly among ex-smokers from Wave 5 to Wave 6. Unexpectedly, quitter self-identity appeared relatively stable among smokers and ex-smokers. After the preliminary analyses, we fitted two models among smokers (Model 1 and 2 for smoker and quitter self-identity, respectively), followed by two multiple-group models among smokers and ex-smokers (Model 3 and 4 for smoker and quitter self-identity, respectively).

### Smokers Subsample: Models 1 and 2

#### Smoker self-identity among smokers (Model 1).

**Growth model without covariates.** The model without covariates fitted the data very well (see Table 2). Model chi-square was significant, but this is common in larger samples,  $\chi^2(1) = 4.52$ ,  $p = .03$ . The mean value of the intercept was significant (3.11,  $p < .001$ ) and had significant variance (.61,  $p < .001$ ), indicating that baseline smoker self-identity differed among smokers. Furthermore, the significant mean slope indicated that smoker self-identity increased over time (.04,  $p = .01$ ), and the slope variance was significant (.05,  $p = .03$ ), indicating variability in smoker self-identity growth. Moreover, the negative covariance between the intercept and slope ( $-.07$ ,  $p = .04$ ) indicated that stronger baseline smoker self-identities were associated with decreases in smoker self-identities over time. Finally, residual variances of manifest variables were significant (all  $p$  values  $< .001$ ).

**Prediction of smoker self-identity baseline and growth.** The model with covariates did not deviate significantly from the data,  $\chi^2(17) = 21.46$ ,  $p = .21$ , and showed good fit (see Table 2). As expected, stronger baseline smoker self-identity (i.e., higher intercepts) was associated with lower SES (vs. middle and higher SES), more positive attitudes toward smoking, more negative attitudes toward quitting, less negative self-evaluative emotions about smoking in general and when smoking outside, less health worries, less own stigma, stronger own acceptance of smoking, and more cigarettes smoked per day (see Table 3).

As expected, smoker self-identity increased over time among lower SES smokers (vs. higher SES). In addition, two effects emerged that were contrary to our expectations (but these effects were not replicated in the cross-validation): Smoker self-identity

Table 1  
Descriptive Statistics and Correlations of Smoker Self-Identity ( $N_{Smokers} = 742$ ;  $N_{Ex-Smokers} = 201$ )  
and Quitter Self-Identity ( $N_{Smokers} = 674$ ;  $N_{Ex-Smokers} = 195$ ) at Waves 4, 5, and 6

Self-identity and wave	Smoker				Ex-smoker			
	<i>M</i> ( <i>SD</i> )	Wave 4	Wave 5	Wave 6	<i>M</i> ( <i>SD</i> )	Wave 4	Wave 5	Wave 6
Smoker								
Wave 4	3.12 (.91)	1			1.51 (.74)	1		
Wave 5	3.11 (.93)	.64***	1		1.50 (.70)	.46***	1	
Wave 6	3.20 (.91)	.57***	.60***	1	1.35 (.67)	.13 <sup>†</sup>	.32***	1
Quitter								
Wave 4	2.76 (.96)	1			4.48 (.75)	1		
Wave 5	2.76 (.97)	.62***	1		4.43 (.77)	.36***	1	
Wave 6	2.73 (.99)	.59***	.62***	1	4.52 (.82)	.14 <sup>†</sup>	.34***	1

<sup>†</sup>  $p < .10$ . \*\*\*  $p < .001$ .



Table 2  
*Fit of Latent Growth Curve Models for Smoker Self-Identity (Model 1; N = 742) and Quitter Self-Identity (Model 2; N = 674) Among Smokers Only*

Model	Fit measure				
	df	$\chi^2$	CFI	RMSEA	SRMR
1: Smoker self-identity					
Without covariates	1	4.52*	.991	.069	.016
With covariates	17	21.46	.996	.019	.009
2: Quitter self-identity					
Without covariates	1	.31	1.00	.00	.004
With covariates	17	13.60	1.00	.000	.007

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual.

\*  $p < .05$ .

decreased among smokers with more negative attitudes toward quitting and less negative self-evaluative emotions about smoking.

**Cross-validation.** Cross-validation showed that the final model generalized well. The cross-validated model did not deviate significantly from the data,  $\chi^2(17) = 19.97$ ,  $p = .28$  and other fit indices confirmed good fit (CFI = .997, RMSEA = .016, SRMR = .011). Results of the cross-validated model were similar to the initial results with regard to prediction of the intercept. However, the association between the intercept and own acceptance became marginally significant, and associations with SES (higher vs. lower, middle vs. lower) and own stigma became nonsignificant. None of the predictors of the slope that were found in Waves 4 through 6 were found, but a significant effect of expected support emerged, such that smoker self-identity decreased among smokers who expected more support for quitting ( $b = -.05$ ,  $\beta = -.15$ ,  $p = .02$ ). In sum, both the initial and cross-validated model showed that stronger baseline smoker self-identity was associated with more positive attitudes toward smoking, more negative attitudes toward quitting, less negative self-evaluative emotions in general and when smoking outside, and less health worries. However, the effects of SES were only found in the initial analyses.

#### Quitter self-identity among smokers (Model 2).

**Growth model without covariates.** The model without covariates showed good fit (see Table 2) and did not deviate significantly from the data,  $\chi^2(1) = .31$ ,  $p = .58$ . The mean value of the intercept was significant (2.76,  $p < .001$ ) and had significant variance (.63,  $p < .001$ ). The mean slope was nonsignificant ( $-.02$ ,  $p = .39$ ), but the slope variance was marginally significant (.06,  $p = .06$ ), indicating some variability in change in quitter self-identity. Finally, the covariance between intercept and slope was nonsignificant ( $-.05$ ,  $p = .16$ ) and residual variance of manifest variables were significant (all  $p$  values  $< .001$ ).<sup>3</sup>

**Prediction of quitter self-identity baseline and growth.** The model with covariates did not deviate significantly from the data,  $\chi^2(17) = 13.60$ ,  $p = .70$  and showed almost perfect fit (see Table 2). As expected, stronger baseline quitter self-identity was significantly associated with more negative attitudes toward smoking, more positive attitudes toward quitting, more negative self-evaluative emotions about smoking, more health worries, and fewer cigarettes smoked per day (see Table 3).

Moreover, and as expected, quitter self-identity increased over time among higher SES smokers (vs. lower SES). In addition, two

effects emerged that were contrary to our expectations: quitter self-identity increased over time among smokers with less negative self-evaluative emotions about smoking and among smokers with less own stigma (but the latter effect was not replicated in the cross-validation).

**Cross-validation.** Cross-validation showed that the final model generalized well (CFI = .959, RMSEA = .048, SRMR = .018). Model chi-square was significant, but this is common in large samples,  $\chi^2(17) = 41.23$ ,  $p = .001$ . Cross-validated results were very similar to the initial results. However, the unexpected effect of own stigma on the slope was no longer significant. In addition, in the cross-validated model quitter self-identity at baseline was stronger when smokers experienced more negative self-evaluative emotions when smoking outside ( $b = -.14$ ,  $\beta = -.14$ ,  $p = .03$ ), or were less accepting of smoking ( $b = -.15$ ,  $\beta = -.14$ ,  $p = .01$ ). In addition, quitter self-identity increased over time among middle (vs. lower) SES smokers ( $b = .13$ ,  $\beta = .14$ ,  $p = .049$ ). In sum, in both the initial and cross-validation analyses, stronger baseline quitter self-identities were associated with more negative attitudes toward smoking, more positive attitudes toward quitting, more negative self-evaluative emotions, more health worries and less own acceptance of smoking. In addition, both the initial and cross-validated model showed that quitter self-identity increased over time among higher SES smokers compared with lower SES smokers.

### Multiple-Group Analyses: Models 3 and 4

#### Smoker self-identity among smokers and ex-smokers (Model 3).

**Growth model without covariates.** We first performed multiple-group analyses on the model without covariates (see Table 7A in the online supplemental material). Equality restrictions could be applied to the intercept variances (MG1) without significantly decreasing model fit compared to MG0. However, other between-groups equality restrictions decreased model fit. The final model (MG1) had good fit (CFI = .990, RMSEA = .060, SRMR = .037). As expected, in the final model (MG1) smokers had a higher mean smoker self-identity intercept (3.10,  $p < .001$ ) than ex-smokers (1.52,  $p < .001$ ). Furthermore, and as expected, smoker self-identity increased over time among smokers (.04,  $p = .01$ ) whereas it decreased among ex-smokers ( $-.07$ ,  $p = .04$ ). Intercept variances were significant in both groups (.56,  $p < .001$ ). Moreover, the slope variance was significant among ex-smokers (.17,  $p < .001$ ) but not among smokers (.04,  $p = .12$ ). Finally, the covariance between the intercept and slope was significant and negative among ex-smokers ( $-.25$ ,  $p < .001$ ) but not among smokers ( $-.05$ ,  $p = .13$ ). As such, smoker self-identities decreased among ex-smokers who identified more with smoking at baseline.

**Prediction of smoker self-identity baseline and growth.** Fit measures indicated that the final model with covariates (MGC4), based on MG1, fitted the data very well (CFI = .997, RMSEA = .013, SRMR = .014; see Table 7B in the online supplemental material). Despite the large sample, the model did not deviate significantly from the data,  $\chi^2(35) = 37.98$ ,  $p = .34$ .

<sup>3</sup> Because the mean slope, slope variance and latent covariance were nonsignificant, we also fitted a model without a slope. Although this model had adequate fit, it did not fit the data as well as the model that included a latent slope.



Table 3  
*Predictors of Intercepts and Slopes of Smoker Self-Identity (Model 1; N = 742) and Quitter Self-Identity (Model 2; N = 674) Among Smokers Only: Final Latent Growth Curve Models With Covariates*

	Smoker self-identity (Model 1)		Quitter self-identity (Model 2)	
	<i>b</i> ( <i>SE</i> )	$\beta$	<i>b</i> ( <i>SE</i> )	$\beta$
	Intercept			
SES (middle vs. low)	-.19 (.05)***	-.12***	.02 (.06)	.01
SES (high vs. low)	-.17 (.07)*	-.09*	.02 (.08)	.01
Negative attitude smoking	-.22 (.05)***	-.19***	.13 (.05)*	.11*
Negative attitude quitting	.19 (.04)***	.21***	-.18 (.05)***	-.18***
Self-evaluative emotions	.19 (.05)***	.24***	-.34 (.04)***	-.43***
Self-evaluative emotions outside	.18 (.07)**	.16**	-.05 (.07)	-.04
Perceived health damage	-.05 (.05)	-.04	.06 (.05)	.05
Health worries	-.12 (.05)*	-.10*	.17 (.06)**	.15**
Perceived prosmoking norms	-.05 (.03)	-.07	.02 (.03)	.03
Perceived proquitting norms	.01 (.04)	-.01	-.01 (.04)	-.01
Expected social support	.07 (.03)†	.07†	-.01 (.03)	-.02
Stigma own	-.09 (.03)*	-.10*	.04 (.04)	.04
Stigma perceived	.06 (.03)†	.08†	-.05 (.03)†	-.07+
Acceptance own	.10 (.05)*	.08*	-.09 (.05)†	-.08+
Acceptance perceived	-.06 (.06)	-.04	.09 (.06)	.06
Cigarettes per day	.01 (.00)**	.12**	-.02 (.00)***	-.15***
	Slope			
SES (middle vs. low)	-.03 (.04)	-.05	.04 (.04)	.07
SES (high vs. low)	-.10 (.04)*	-.15*	.14 (.05)**	.20**
Negative attitude smoking	-.01 (.03)	-.02	-.02 (.04)	-.05
Negative attitude quitting	-.07 (.03)*	-.20*	.05 (.04)	.14
Self-evaluative emotions	-.07 (.03)*	-.25*	.09 (.03)**	.31**
Self-evaluative emotions outside	.05 (.04)	.14	-.06 (.04)	-.15
Perceived health damage	.03 (.03)	.09	-.02 (.03)	-.05
Health worries	-.04 (.04)	-.10	.01 (.04)	.03
Perceived prosmoking norms	.02 (.02)	.09	-.01 (.02)	-.05
Perceived proquitting norms	.00 (.03)	.01	.03 (.03)	.10
Expected social support	-.03 (.02)†	-.09†	.03 (.02)	.08
Stigma own	.04 (.02)†	.13†	-.06 (.03)*	-.18*
Stigma perceived	-.01 (.02)	-.05	.04 (.02)	.12
Acceptance own	-.06 (.03)†	-.15†	.02 (.04)	.04
Acceptance perceived	.03 (.03)	.08	-.04 (.04)	-.09
Cigarettes per day	.00 (.00)	-.02	.00 (.00)	.05

Note. SES = socioeconomic status.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

All associations with the intercept (i.e., baseline identity) were in the expected direction. Among both smokers and ex-smokers, smoker self-identity was significantly stronger at baseline among those with lower SES (vs. middle SES), and when attitudes toward smoking were more positive (see Table 4). In addition, lower SES smokers (but not ex-smokers) had stronger baseline smoker self-identities than higher SES smokers, and smokers with more negative attitudes toward quitting, less perceived health damage and less own stigma had stronger baseline smoker self-identities. Ex-smokers (but not smokers) with more negative attitudes toward quitting had stronger baseline smoker self-identities.

Furthermore, and as expected, smoker self-identity decreased over time among both smokers and ex-smokers with higher SES (vs. lower SES). Moreover, smoker self-identity decreased among ex-smokers (but not smokers) who perceived more health damage and proquitting norms. In addition, four unexpected findings emerged (but all except one were not replicated in the cross-validation analyses): In both groups, smoker self-identity decreased with more negative attitudes

toward quitting and increased with more own stigma. In addition, smoker self-identity decreased among smokers who were more accepting of smoking, and increased among ex-smokers who held more negative attitudes toward smoking.

**Cross-validation.** Cross-validation of the final MGC showed that the model generalized well. Specifically, the cross-validated model did not deviate significantly from the data despite the large sample size,  $\chi^2(36) = 40.25$ ,  $p = .29$  and other fit measures confirmed good fit (CFI = .995, RMSEA = .018, SRMR = .015).<sup>4</sup> Cross-validated results showed similar associations between covariates and the intercepts as were found in the initial analyses, although higher SES did not predict lower baseline smoker self-identity among smokers. However, no predictors of the smoker self-identity slope were found, except for the unex-

<sup>4</sup> The slope variance was set to zero among ex-smokers because it was negative in the original cross-validated model.

Table 4  
*Predictors of Intercepts and Slopes of Smoker Self-Identity Among Smokers (N = 742) and Ex-Smokers (N = 201): Final Latent Growth Curve Model With Covariates (Model 3)*

	Smokers		Ex-smokers	
	<i>b</i> (SE)	β	<i>b</i> (SE)	β
Intercept				
SES (middle vs. low) <sup>a</sup>	-.15 (.05)**	-.10**	-.15 (.05)**	-.11**
SES (high vs. low)	-.15 (.07)*	-.08*	.05 (.09)	.03
Negative attitude smoking <sup>a</sup>	-.31 (.04)***	-.28***	-.31 (.04)***	-.35***
Negative attitude quitting	.30 (.04)***	.31***	.43 (.08)***	.35***
Perceived health damage	-.13 (.05)**	-.12**	.13 (.07) <sup>†</sup>	.14 <sup>†</sup>
Perceived prosmoking norms	-.01 (.03)	-.01	-.07 (.04) <sup>†</sup>	-.10 <sup>†</sup>
Perceived proquitting norms	-.02 (.04)	-.02	.08 (.05) <sup>†</sup>	.10 <sup>†</sup>
Stigma own	-.15 (.04)***	-.17***	-.02 (.05)	-.03
Stigma perceived	.04 (.03)	.05	-.06 (.05)	-.08
Acceptance own	.24 (.05)***	.21***	-.04 (.08)	-.04
Acceptance perceived <sup>a</sup>	-.10 (.05) <sup>†</sup>	-.07 <sup>†</sup>	-.10 (.05) <sup>†</sup>	-.09 <sup>†</sup>
Slope				
SES (middle vs. low) <sup>a</sup>	-.03 (.03)	-.06	-.03 (.03)	-.04
SES (high vs. low) <sup>a</sup>	-.14 (.04)***	-.22***	-.14 (.04)***	-.19***
Negative attitude smoking	-.02 (.03)	-.06	.14 (.04)***	.29***
Negative attitude quitting <sup>a</sup>	-.09 (.03)**	-.28**	-.09 (.03)**	-.13**
Perceived health damage	.03 (.03)	.09	-.12 (.05)*	-.25*
Perceived prosmoking norms <sup>a</sup>	.02 (.02)	.09	.02 (.02)	.06
Perceived proquitting norms	.00 (.03)	.01	-.10 (.04)**	-.22**
Stigma own <sup>a</sup>	.04 (.02)*	.13*	.04 (.02)*	.09*
Stigma perceived <sup>a</sup>	-.01 (.02)	-.04	-.01 (.02)	-.02
Acceptance own	-.08 (.03)**	-.20**	.10 (.04)*	.19*
Acceptance perceived <sup>a</sup>	.05 (.03) <sup>†</sup>	.12 <sup>†</sup>	.05 (.03) <sup>†</sup>	.09 <sup>†</sup>

Note. SES = socioeconomic status.

<sup>a</sup>Equal between groups.

<sup>†</sup>  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

pected association between more negative attitude toward smoking and increasing smoker self-identity among ex-smokers. In sum, both the initial and cross-validated model showed that, among smokers and ex-smokers, baseline smoker self-identities were stronger among those with lower SES (vs. middle SES), more positive attitudes toward smoking and more negative attitudes toward quitting. Moreover, smokers (but not ex-smokers) identified more strongly with smoking at baseline when they perceived less health damage and had less own stigma and more own acceptance of smoking. With regard to prediction of the slope, only the contrary finding that smoker self-identity increased over time among ex-smokers with more negative attitudes toward smoking was found in both the initial and cross-validation analyses.

**Quitter self-identity among smokers and ex-smokers (Model 4).**

**Growth model without covariates.** We first performed multiple-group analyses on the model without covariates (see Table 8A in the online supplementary material). In contrast to results for smoker self-identity, MG6 showed the best fit with the data (CFI = 1.00, RMSEA = .000, SRMR = .021). Slope variances, latent covariances, residual variances and mean slopes were equal between groups, and intercept variances and mean intercepts were freely estimated. As expected, smokers had a lower mean quitter self-identity intercept (2.75,  $p < .001$ ) than ex-smokers (4.49,  $p < .001$ ). Intercept variances were significant among smokers (.65,  $p < .001$ ) and ex-smokers (.27,  $p < .001$ ). Unexpectedly, the mean slope of quitter self-identity was nonsignificant

in both groups ( $-.01$ ,  $p = .65$ ). However, the slope variance was significant in both groups (.08,  $p < .01$ ), indicating individual variability in development of quitter self-identity. Moreover, the covariance between the intercept and slope was significant and negative in both groups ( $-.07$ ,  $p = .02$ ), such that quitter self-identity decreased over time among those with stronger quitter self-identities at baseline.

**Prediction of quitter self-identity baseline and growth.** Fit measures indicated that the final model with covariates (MGC4), which was based on MG6, fitted the data very well (CFI = 1.00, RMSEA = .000, SRMR = .012; see Table 8B in the online supplementary material). Despite the large sample, the model did not deviate significantly from the data,  $\chi^2(43) = 32.78$ ,  $p = .87$ .

In line with expectations, results showed that in both groups more negative attitudes toward smoking were associated with stronger baseline quitter self-identity, and more negative attitudes toward quitting were associated with weaker baseline quitter identities in both groups (see Table 5). Furthermore, and also as expected, smokers (but not ex-smokers) with more perceived health damage, more own stigma, and less own acceptance of smoking had stronger baseline quitter self-identities. Finally, we found an unexpected effect of perceived acceptance on the intercept in both groups, but this effect was due to suppression (specifically, quitter self-identity at baseline appeared stronger when perceived acceptance was higher, but this effect turned into the expected direction when only perceived acceptance was used to predict the intercept and slope,  $b = -.12$ ,  $\beta = -.14$ ,  $p = .02$ ).

Table 5  
*Predictors of Intercepts and Slopes of Quitter Self-Identity Among Smokers (N = 674) and Ex-Smokers (N = 195): Final Latent Growth Curve Model With Covariates (Model 4)*

	Smokers		Ex-smokers	
	<i>b</i> (SE)	$\beta$	<i>b</i> (SE)	$\beta$
Intercept				
SES (middle vs. low) <sup>a</sup>	.07 (.06)	.05	.07 (.06)	.07
SES (high vs. low) <sup>a</sup>	.08 (.07)	.04	.08 (.07)	.08
Negative attitude smoking <sup>a</sup>	.24 (.04) <sup>***</sup>	.21 <sup>***</sup>	.24 (.04) <sup>***</sup>	.36 <sup>***</sup>
Negative attitude quitting	-.36 (.05) <sup>***</sup>	-.38 <sup>***</sup>	-.57 (.08) <sup>***</sup>	-.63 <sup>***</sup>
Perceived health damage	.16 (.05) <sup>**</sup>	.15 <sup>**</sup>	-.02 (.05)	-.03
Perceived prosmoking norms <sup>a</sup>	-.02 (.03)	-.02	-.02 (.03)	-.03
Perceived proquitting norms <sup>a</sup>	-.03 (.03)	-.03	-.03 (.03)	-.04
Stigma own	.12 (.04) <sup>**</sup>	.13 <sup>**</sup>	-.10 (.06) <sup>†</sup>	-.19 <sup>†</sup>
Stigma perceived	-.03 (.04)	-.04	.07 (.05)	.11
Acceptance own	-.24 (.05) <sup>***</sup>	-.21 <sup>***</sup>	-.03 (.08)	-.04
Acceptance perceived <sup>a</sup>	.12 (.05) <sup>*</sup>	.09 <sup>*</sup>	.12 (.05) <sup>*</sup>	.15 <sup>*</sup>
Slope				
SES (middle vs. low)	.02 (.04)	.03	.15 (.06) <sup>**</sup>	.27 <sup>**</sup>
SES (high vs. low) <sup>a</sup>	.13 (.04) <sup>**</sup>	.21 <sup>**</sup>	.13 (.04) <sup>**</sup>	.24 <sup>**</sup>
Negative attitude smoking	-.01 (.03)	-.03	-.16 (.05) <sup>**</sup>	-.42 <sup>**</sup>
Negative attitude quitting <sup>a</sup>	.09 (.03) <sup>**</sup>	.29 <sup>**</sup>	.09 (.03) <sup>**</sup>	.19 <sup>**</sup>
Perceived health damage <sup>a</sup>	.00 (.02)	.00	.00 (.02)	.00
Perceived prosmoking norms <sup>a</sup>	.00 (.02)	-.02	.00 (.02)	-.02
Perceived proquitting norms <sup>a</sup>	.06 (.03) <sup>*</sup>	.19 <sup>*</sup>	.06 (.03) <sup>*</sup>	.18 <sup>*</sup>
Stigma own	-.07 (.03) <sup>**</sup>	-.21 <sup>**</sup>	-.01 (.04)	-.03
Stigma perceived <sup>a</sup>	.02 (.02)	.09	.02 (.02)	.08
Acceptance own	.03 (.03)	.08	-.13 (.06) <sup>*</sup>	-.34 <sup>*</sup>
Acceptance perceived <sup>a</sup>	-.05 (.03) <sup>†</sup>	-.12 <sup>†</sup>	-.05 (.03) <sup>†</sup>	-.12 <sup>†</sup>

Note. SES = socioeconomic status.

<sup>a</sup>Equal between groups.

<sup>†</sup> $p < .10$ . <sup>\*</sup> $p < .05$ . <sup>\*\*</sup> $p < .01$ . <sup>\*\*\*</sup> $p < .001$ .

Results further showed, as expected, that in both groups quitter self-identity increased among higher SES participants (compared with lower SES), and when perceived proquitting norms were stronger. In addition, quitter self-identity increased among middle SES (vs. lower SES) ex-smokers, and among ex-smokers with less own acceptance of smoking, but this was not found among smokers. Finally, four unexpected effects were found, such that quitter self-identity increased among smokers and ex-smokers with more negative attitudes toward quitting, decreased among smokers with more own stigma, and decreased among ex-smokers with more negative attitudes toward smoking.

**Cross-validation.** Cross-validation showed that the model generalized well. Model chi-square was significant,  $\chi^2(43) = 66.69$ ,  $p = .01$ , but this is common in larger samples. Importantly, fit measures indicated good fit (CFI = .973, RMSEA = .040, SRMR = .020). Cross-validated results were similar to those found in the initial analyses. However, the positive association between own stigma and the quitter self-identity intercept became marginally significant among smokers, and the effects of SES (middle vs. lower) and own acceptance on the quitter self-identity slope became nonsignificant among ex-smokers. In addition, an effect of perceived prosmoking norms emerged in the cross-validated model, such that stronger perceived prosmoking norms were associated with weaker baseline quitter self-identity (i.e., lower intercept) among smokers ( $b = -.10$ ,  $\beta = -.14$ ,  $p < .01$ ) and ex-smokers ( $b = -.10$ ,  $\beta = -.15$ ,  $p < .01$ ). In sum, most associations with the intercept were replicated in the cross-

validation analyses; that is, stronger baseline quitter self-identity was associated with more negative attitudes toward smoking and more positive attitudes toward quitting among smokers and ex-smokers, and with more perceived health damage and less own acceptance among smokers (but not ex-smokers). In addition, in both the initial and cross-validation analyses, quitter self-identity increased over time among those with higher SES (vs. lower SES), and among those who perceived stronger proquitting social norms. Finally, four unexpected effects on the slope were found in both the initial and cross-validation analyses.

## Discussion

The current study is the first to longitudinally examine changes in smoker and quitter self-identity among a large sample of smokers and ex-smokers, and to investigate whether baseline identity and identity development could be predicted by SES and psychosocial factors. We used latent growth curve modeling as an advanced statistical technique to model and predict identity change, and then cross-validated the models to establish generalizability of the findings. Overall, results generalized well beyond the initial analyses to the cross-validation sample (RQ4).

Results confirmed that smokers perceive themselves more as smokers and less as quitters than do ex-smokers (RQ1). Furthermore, results provided new insights in identity change, showing that identification with smoking increases over time among smokers, whereas it decreases among ex-smokers, confirming the hy-

potheses. Unexpectedly, average quitter self-identity does not change significantly over time among smokers and ex-smokers as groups, although the results showed individual variability in quitter self-identity change in both groups. As such, identification with quitting does change over time in individual smokers and ex-smokers.

Furthermore, results showed that psychosocial factors are relevant for baseline identity and identity development (RQ2), even after controlling for smoking behavior. Perceived stigma was the only covariate that was unrelated to any outcome, and prosmoking social norms were only related to baseline quitter self-identity in the cross-validation sample. Socioeconomic status appears particularly important, as it is the only covariate that is associated with baseline identity and identity development among smokers and ex-smokers. Specifically, lower SES smokers (vs. middle and higher SES) and lower SES ex-smokers (vs. middle SES) identify more with smoking. In addition, smoker self-identities decrease and quitter self-identities increase over time among higher SES smokers and ex-smokers. This corresponds with previous work showing that lower SES smokers have more difficulty picturing themselves as nonsmokers than higher SES smokers (Meijer et al., 2015). Moreover, the current study extended these findings to ex-smokers, and also showed that higher SES smokers and ex-smokers move away from smoking and toward quitting more quickly than their lower SES counterparts. In other words, smoker- and quitter-identities appear more resistant to change among lower SES groups. Correspondingly, previous work shows that lower SES smokers are less likely to quit, have worse experiences with quitting, and relapse more often (e.g., Fernandez et al., 2006; Pisinger et al., 2011; Reid et al., 2010; Wetter et al., 2005). In addition, people with lower SES backgrounds appear to have lower self-concept clarity in general than people with higher SES (Na, Chan, Lodi-Smith, & Park, 2016).

In addition to SES, only stronger perceived proquitting social norms are important for changes in identification with quitting over time among both smokers and ex-smokers (not taking contrary effects into account). Moreover, ex-smokers who perceive stronger proquitting norms identify less with smoking over time. The other psychosocial variables are not associated with identity change. The importance of proquitting social norms corresponds with recent models on social identity change in the context of recovery from addiction, which underscore that prorecovery social norms may facilitate increasing identification with recovery (Best et al., 2015; Frings & Albery, 2015). Relatedly, work on identity compatibility shows that people more easily adopt new identities that fit in with their social environment (Iyer, Jetten, Tsivrikos, Postmes, & Haslam, 2009).

Results further showed that attitudes are consistently associated with baseline identities, but not with identity change. Specifically, more positive attitudes toward smoking and more negative attitudes toward quitting are associated with stronger smoker self-identities and weaker quitter self-identities at baseline in both groups. This is in line with qualitative work that suggests that attitudes toward smoking and smoking-related self-perceptions are associated (Bottorff et al., 2000; Brown, 1996; Luck & Beagan, 2015; cf. De Bruijn et al., 2012). Importantly, although attitude and identity are clearly associated, a meta-analysis on self-identity and the theory of planned behavior showed that attitude and identity uniquely predict intentions to engage in health behavior (Rise,

Sheeran, & Hukkelberg, 2010), implying that attitude and identity are separate constructs.

Multiple-group analyses, comparing smokers and ex-smokers, further showed that own acceptance of smoking and perceived health damage are related to baseline identity among smokers only and to identity development among ex-smokers only, indicating that some correlates of identity differ before and after quitting smoking (RQ3). Notably, the identities as quitter and smoker have different roles among smokers and ex-smokers. The identity as a quitter likely is a possible self (Barreto & Frazier, 2012; Markus & Nurius, 1986) for smokers and a current self for ex-smokers, whereas the identity as a smoker likely is a current self for smokers, and may be a past, current (Vangeli et al., 2010), or (undesired) possible self for ex-smokers. Possible and current selves affect behavior differently. Possible selves are important guides for behavior, as people are motivated to achieve desired possible selves and avoid negative possible selves (Barreto & Frazier, 2012; Markus & Nurius, 1986). Furthermore, people strive for a positive view of their current self and behave in line with strong current identities (e.g., West, 2006).

The smokers-only models (with additional covariates measured among smokers but not ex-smokers; Model 1 and 2) showed that smokers who experience more negative self-evaluative emotions about smoking and worry more about their future health have stronger quitter self-identities and weaker smoker self-identities. In addition, more negative self-evaluative emotions when smoking outside (as a consequence of the Dutch smoking ban in hospitality venues) and more expected support for quitting smoking are associated with weaker smoker self-identity.

Finally, we found a number of effects on identity development (i.e., slopes) that were unexpected and contrasted effects on baseline identity (i.e., intercepts), but many were not replicated in the cross-validation analyses. However, in both the initial and cross-validation analyses, less negative self-evaluative emotions about smoking and less own smoker stigma were associated with increasing quitter self-identity among smokers, more negative attitudes toward smoking were associated with increasing smoker self-identity and decreasing quitter self-identity among ex-smokers, and more negative attitudes toward quitting were associated with increasing quitter self-identity among smokers and ex-smokers. Future research is needed to assess replicability of these findings in other samples.

The current study has limitations. First, although the longitudinal design allowed for examination of (precedents of) identity change over time, analysis of subtler changes in identity was not possible due to the yearly interval between measurements. Moreover, finer-grained processes such as conflicts between identities and self-relevant situations (e.g., becoming pregnant) are likely to be relevant (cf. Burke, 2006). Weekly or daily measurements, for example through mobile phones (cf. Scholz et al., 2016), would allow for examination of such processes. Second, about a quarter of smokers undertook at least one unsuccessful quit attempt between the waves, and a very small minority of ex-smokers relapsed and quit again, which might have affected the findings. Weekly or daily measurements as described in the preceding text will further insight in this respect. Relatedly, we did not include people with changing smoking statuses across waves (e.g., someone who was a smoker, ex-smoker, and smoker at Waves 4 through 6, respectively) because this group would have been too heterogeneous to



draw reliable conclusions and an even larger sample than that used in the current study would be needed to enable analysis of specific subgroups. This approach, as well as selective attrition, may have affected representativeness, although the samples at each of the waves were representative of the Dutch population of smokers (Nagelhout et al., 2010, 2016). Importantly, our approach ensured validity of responses over time, as current smoking status may affect the way people answer the questions. Third, the cross-validation sample differed in some respects from the initial sample, which may explain why some findings were not confirmed in the cross-validation analyses. The cross-validation sample contained relatively few ex-smokers and more lower SES and slightly younger participants, and more ex-smokers in the cross-validation sample than in the initial sample relapsed between waves. Relatedly, although the majority of participants in the cross-validation sample were not included in the initial sample, 40% of participants in the cross-validation sample had also been part of the initial sample, such that, to some extent, the same participants were modeled. Fourth, the selection of psychosocial predictors was limited to factors that appeared relevant in previous work and were measured in the current study, but other factors may also be relevant (e.g., motives for smoking, self-efficacy). Fifth, income could have been used in addition to educational level to measure SES (Schaap, van Agt, & Kunst, 2008), although educational level is a better indicator of risk of smoking than income (Schaap & Kunst, 2009). Finally, as is inevitable in large-scale longitudinal studies, identity constructs and most psychosocial variables were measured with only one to three items. However, this did enable us to include a wide range of psychosocial factors that appeared to be relevant in previous work, to explain and predict identity and changes in identity.

Notwithstanding these limitations, our results have important implications. The significance of SES (i.e., identity is more resistant to change among those with lower SES) suggests that efforts to strengthen identification with quitting and decrease identification with smoking should be aimed primarily at lower SES smokers and ex-smokers. Findings further suggest that strengthening social norms in favor of quitting may be a useful approach to influence identity, for example by adding such elements to mass media smoking cessation campaigns or (group) smoking cessation interventions. In addition, interventions could directly focus on facilitating identity change. Previous work suggests that interventions that use narratives (McAdams & McLean, 2013; Parry, Fowkes, & Thomson, 2001; Pennebaker, 2004, 2010) or avatars (Song, Kim, Kwon, & Jung, 2013) may help smokers and ex-smokers increase identification with quitting and decrease identification with smoking. There is evidence to suggest that quitter self-identity may be even more important as a target for such interventions than smoker self-identities, as quitter identities are more relevant for smoking cessation (Meijer et al., 2015, 2016, 2017). Furthermore, because identity appears to be related to different factors among smokers and ex-smokers, identity interventions will need to be tailored to smoking status.

To conclude, this was the first large-scale longitudinal study to examine change, and predictors of change, in smoker and quitter self-identity among smokers and ex-smokers. Results showed that smoker and quitter self-identity differ between smokers and ex-smokers, that identity can be predicted by SES and psychosocial constructs, and that processes with regard to changes in identity

may differ between smokers and ex-smokers. SES and perceived proquitting social norms appear particularly important for identity change among both smokers and ex-smokers, and should be taken into account when developing ways to facilitate identity change.

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Received November 8, 2016

Revision received March 31, 2017

Accepted April 5, 2017 ■