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# Self-efficacy and acceptance of cravings to smoke underlie the effectiveness of quitline counseling for smoking cessation

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ABSTRACT

*Background:* Few studies have examined why smoking cessation interventions are effective. The aim of this study was to examine the mediating processes underlying the effectiveness of cessation counseling administered by the Dutch national quitline.
*Methods:* Data were used of a two-arm randomized controlled trial in which smoking parents, who were recruited through primary schools in The Netherlands, received either quitline cessation counseling ($n = 256$) or a self-help brochure ($n = 256$). The endpoint was 6-months prolonged abstinence at 12-months follow-up, with 86.7% outcome data retention. Putative psychological mediators of treatment effectiveness included smoking-related cognitions (positive smoking outcome expectancies, self-efficacy), emotions (negative affect, perceived stress, depressive symptoms), and smoking cue coping methods (avoidance coping, acceptance coping) assessed at 3-months post-measurement.
*Results:* Quitline cessation counseling significantly decreased positive smoking outcome expectancies and negative affect and increased self-efficacy to refrain from smoking, avoidance of external cues to smoking, and acceptance of internal cues to smoking compared to self-help material. Increased self-efficacy to refrain from smoking in stressful and tempting situations ($p < .001$) and increased acceptance of cravings to smoke ($p < .001$) significantly mediated the effect of quitline cessation counseling on prolonged abstinence at 12-months follow-up (explained variance: 25.1%).
*Conclusions:* Self-efficacy to refrain from smoking and acceptance of cravings represent an important source of therapeutic change in smoking cessation counseling.


## 1. Introduction

Cigarette smoking constitutes a substantial public health problem (World Health Organization, 2010). A range of psychological treatments has been shown effective in enhancing smoking cessation (Lancaster et al., 2000; Lemmens et al., 2008), but relatively little is known about the mechanisms underlying effective treatments. Although randomized controlled trials are frequently conducted to examine the effectiveness of various smoking cessation treatments, only few studies report psychological mediators of treatment outcome (i.e., the underlying processes responsible for treatment-induced change). Among pharmacological cessation treatments (i.e., bupropion, nicotine replacement therapy), decreases in craving, withdrawal, and negative affect have been shown to mediate medication effectiveness (Bolt et al., 2012; Lerman et al., 2002; McCarthy et al., 2008). Among psychological cessation treatments (i.e., individual counseling, web-based interventions, cell phone interventions) perceived program relevance and increased self-efficacy to resist smoking were identified as processes mediating treatment effectiveness (Bricker et al., 2010a,b; Strecher et al., 2006; Vidrine et al., 2006). In this study, we examined the putative mediators of telephone-based cessation counseling. Understanding the extent to which cessation treatments effectively change processes that contribute to successful smoking cessation is valuable in understanding the active elements in treatment. This knowledge may help to further improve the potency and cost-effectiveness of cessation treatments.

In a meta-analytic review of reviews examining the effects of different smoking cessation interventions (including face-to-face counseling, group therapy, telephone counseling, physician

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advice, nursing interventions, self-help material, and pharmacological interventions), odds ratios for smoking cessation between 1.42 and 2.17 have been observed compared to placebo, no intervention or a minimal intervention (Lemmens et al., 2008). Telephone or quitline counseling is convenient and available to the vast majority of smokers. In nearly all countries of Western Europe and North America, national quitlines offer cessation counseling as a treatment for nicotine addiction. Accumulating evidence indicated that quitline counseling is a cost-effective public health intervention (Cromwell et al., 1997; Kahende et al., 2009; Tomson et al., 2004), with a high potential public health impact. A recent meta-analysis (Stead et al., 2013) concluded that the relative odds ratio of achieving abstinence was 1.56 (95% confidence interval = 1.38–1.77) among smokers receiving telephone counseling compared to smokers receiving less intensive interventions. We recently demonstrated the effectiveness of cessation counseling administered by the Dutch national quitline compared to a standard self-help brochure in increasing cessation rates among the population of smoking parents, who represent a high priority subpopulation among smokers (Schuck et al., 2014). In this trial, cessation counseling was found to be highly effective in increasing sustained abstinence rates at one-year follow-up compared to a self-help brochure (23.4% and 5.9%, $p < 001$). The present study sought to identify the underlying psychological processes that mediate the effectiveness of cessation counseling. Although the trial focused on quitline counseling among smoking parents, we examined putative psychological mediators that are relevant to a variety of populations and smoking cessation interventions. Specifically, we examined several psychological processes (i.e., cognition, emotions, coping) that are putatively targeted by psychological cessation treatments.

In the present study, quitline counseling was a comprehensive treatment including behavioral counseling, supplementary folders, and the recommendation to use nicotine replacement therapy or a pharmacological agent (for more information, see Schuck et al., 2013, 2014). Generally, quitline counseling was based on cognitive-behavioral therapy (CBT) and Motivational Interviewing (MI). CBT is the current standard counseling approach to smoking cessation, which aims to change dysfunctional smoking-related cognitions, to teach methods to avoid or control cues or situations that trigger smoking, and to teach strategies for mood management (Forman et al., 2007). Motivational Interviewing is a client-centered approach, which aims to enhance commitment by resolving ambivalence and by focusing on personal values and goals to design and implement behavior change strategies (Miller and Rollnick, 2002). Although MI is not necessarily a mindfulness- or acceptance-based treatment (such as acceptance-and-commitment therapy; ACT), it is consistent with many of the same principles (e.g., being mindful of one's thoughts, feelings, and sensations without trying to control them) (Bricker et al., 2013). A large body of research has demonstrated the effectiveness of CBT-based treatments (Perkins et al., 2008; Song et al., 2010) and MI-based treatments (Hackman and Eglestone, 2010; Hettema and Hendricks, 2010) for smoking cessation, and accumulating evidence suggests that acceptance-focused treatments compare well with current standard treatments such as CBT and pharmacotherapy (Bricker et al., 2013; Gifford et al., 2004; Hernandez-Lopez et al., 2009). The psychological processes intended to be targeted by CBT-, MI-, and ACT-based treatments include smoking-related cognitions (e.g., positive outcome expectancies of smoking, perceived ability to refrain from smoking in stressful and tempting situations), emotions (e.g., negative affect, perceived stress, depressive symptoms), and behavior (e.g., avoidance of external smoking-related cues, acceptance of internal cues to smoking).

Previous studies have shown that cognitive, emotional, and behavioral processes are important in successful smoking cessation. Smoking outcome expectancies have been shown to distinguish between smokers who planning to quit and smokers who are not planning to quit (Dijkstra et al., 1996), and positive outcome expectancies of smoking have been shown to hinder the initiation of abstinence and to predict relapse following a quit attempt (Vangeli et al., 2011). Smokers with higher self-efficacy to refrain from smoking are more likely to initiate and maintain abstinence during unaided as well as aided quit attempts (Gwaltney et al., 2009; Schnoll et al., 2011; Shiffman et al., 2000). Increases in negative affect following a quit attempt have been shown to predict relapse to smoking in unaided quitters and treatment-seekers (Kenford et al., 2002; Shiffman et al., 1996; Shiffman and Waters, 2004). High levels of stress have been shown to increase the risk of relapse during cessation attempts in some studies (Carey et al., 1993; D'Angelo et al., 2001), but not in others (Shiffman and Waters, 2004). Depressed mood is generally assumed to predict poor treatment outcome among smokers, although findings have been mixed (Berlin and Covey, 2006). The use of coping strategies also plays a role in the outcome of a quit attempt. Recent quitters who reported using coping strategies during temptations to smoke were 12 times more likely to remain abstinent during a tempting situation than those who did not (Shiffman et al., 1996). Recently, acceptance of cravings to smoke has been shown to contribute to successful smoking cessation among smokers receiving ACT-based smoking cessation interventions (Bricker et al., 2013; Gifford et al., 2011).

The objective of the present study was to examine whether cognitive, emotional, and coping processes are putative mediators underlying the effectiveness of cessation counseling. We hypothesized that smokers receiving cessation counseling would report less positive outcome expectancies of smoking, increased self-efficacy, lower negative affect, perceived stress, and depressive symptoms, as well as increased avoidance of external cues to smoking and increased acceptance of cravings to smoke in comparison to smokers receiving a minimal self-help intervention. We hypothesized that these variables would, in turn, predict prolonged smoking cessation at 12-months follow-up.

## 2. Methods

### 2.1. Study design

The present study was a 2-arm randomized controlled trial conducted among smoking parents. Smoking parents were randomly assigned to receive cessation counseling administered by the Dutch national quitline ($n = 256$) or a standard self-help brochure ($n = 256$). The study is registered in The Netherlands Trial Register (NTR2707), the full study protocol is publicly available (Schuck et al., 2011), and the primary outcomes of the trial have been published in accordance with the Consolidated Standards of Reporting Trials (CONSORT; Schuck et al., 2014).

### 2.2. Participants and procedure

Smoking parents were recruited through their children's primary schools across the Netherlands. Primary schools were contacted by research assistants and asked to distribute study invitation letters to parents through children. Out of 890 contacted schools, 438 schools (49.2%) agreed to participate, and approximately 35,000 letters were mailed to schools. Study inclusion criteria were: Being a daily or weekly smoker, being a parent/caretaker of a child (aged 9–12 years), and wanting to quit smoking (currently or in the future). Parents registered to take part in the study by mail, e-mail, telephone, or via a website. Subsequently, consent forms and baseline questionnaires were sent to participants. Full reports of the study design and the recruitment