



## Pretreatment cue reactivity predicts end-of-treatment smoking

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### Abstract

Although a substantial body of literature has established a relationship between cue reactivity and theoretically relevant addiction variables, the association with treatment process variables remains largely unexplored. In the current investigation, 62 smokers participated in a smoking cue reactivity study, and subsequently enrolled in a smoking cessation program. Hierarchical regressions revealed mean heart rate during the cue presentation phase of the laboratory-based assessment predicted final session smoking rate and expired CO level. Fagerström Tolerance Questionnaire score also predicted final session smoking rate. To the extent that rate reduction serves as an index of treatment progress, it may be of value in future cue reactivity research.

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Numerous studies have demonstrated cue reactivity to be a valid and reliable predictor of addiction variables of clinical and theoretical interest (Brandon, Piasecki, Quinn, & Baker, 1995; Drummond, 2000). A variety of factors have been shown to impact reactivity parameters, including type of cue, nicotine deprivation, mood, nicotine dependence, and gender (Carter & Tiffany, 1999; Niaura et al., 1998; Payne, Schare, Levis, & Colletti, 1991; Payne, Smith, Sturges, & Holleran, 1996; Tiffany & Drobes, 1990).

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Considerably less data is available addressing the association between cue reactivity and treatment outcome. [Abrams, Monti, Carey, Pinto, and Jacobus \(1988\)](#) examined pretreatment heart rate reactivity (as well as behavioral measures) to laboratory-based social challenges which incorporated smoking cues. Results indicated differences among relapsers, quitters and controls (Study 1), and prospectively for quitters vs. smokers at six months post-treatment (Study 2). In contrast, [Niaura, Abrams, Monti, and Pedraza \(1989\)](#) found that pretreatment reactivity measures were unrelated to outcome measures, whereas post-treatment reactivity measures were associated with 6-month smoking status. [Shadel, Niaura, Rohsenow, Sirota, and Monti \(1998\)](#) found that reactivity to smoking content-related audiotapes presented pre-quit day did not predict smoking treatment outcome over a 30-day period. Finally, [Niaura, Abrams, DeMuth, Pinto, and Monti \(1992\)](#), using a fine-grained event-related heart rate analysis, demonstrated that smokers who relapsed by 3-months post-treatment were more likely to respond to smoking cues presented prior to treatment with a deceleratory change in heart rate.

As is evident, this limited body of literature has produced mixed findings. One possibility for these inconsistent results involves reliance on an examination of the relationship between cue reactivity and end-of-treatment or follow-up abstinence status. This approach may provide insufficient sensitivity to detect effects, due to the dichotomous nature of the outcome, as well as the ultimate confluence of many variables in determining success. In contrast, the association between cue reactivity and a proximal, continuous, treatment process variable may elucidate its role in the cessation effort, and provide greater power to explore this possibility. Such an approach would also serve to enhance our understanding of the mechanisms underlying cue reactivity (e.g., motivational, conditioned association, etc.; see [Drummond, 2000](#)). To our knowledge, this possibility has yet to be explored.

In tobacco cessation programs, reduction in daily smoking rate serves as one such process variable. Smoking cessation programs routinely utilize rate fading approaches as a technique to ultimately achieve abstinence, a practice supported by earlier work (e.g., [Foxy & Axelroth, 1983](#); [Singh & Leung, 1988](#)). In addition to its implementation within formal treatment programs, a substantial percentage of smokers report having used gradual reduction methods in their efforts to quit smoking ([Gallup Organization, 1999](#); [Yankelovich Partners, 1998](#)). The clinical rationale for this approach includes: (a) gradual reduction in daily nicotine intake to reduce withdrawal symptom severity, (b) to permit the development of and opportunities to practice effective coping strategies prior to the quit attempt, (c) to minimize the negative impact of failure experiences during early pre-quit phases of treatment, and (d) to extinguish the association between tobacco intake and various conditioned stimuli.

Despite the logic of this rationale, the USPHS Guideline panel concluded that cigarette fading strategies were ineffective (OR=1.1, [Fiore, Bailey, Cohen, Dorfman, Goldstein, Gritz, et al., 2000](#)). However, the panel also recognized that this conclusion may be premature, and indicated need for additional research. We agree with this stance, based on a number of issues. For example, nicotine fading can be accomplished via a variety of procedures (e.g., different rate reduction approaches, graduated filters, brand fading), which may not be equivalent in effectiveness. In addition, the examination of more recent, methodologically superior work has supported the use of rate fading as a treatment strategy, as well as a marker of ultimate success in quitting ([Cinciripini et al., 1995](#); [Falba, Jofre-Bonet, Busch, Duchovny, & Sindelar, 2004](#); [Farkas, 1999](#)). Indeed, a recently published best practices clinical handbook for tobacco dependence encourages the incorporation of nicotine fading procedures ([Abrams](#)

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