PREDICTING ALCOHOL MISUSERS’ READINESS AND ABILITY TO QUIT SMOKING: A CRITICAL REVIEW

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Abstract — Aims: The prevalence of smoking among individuals with alcohol use disorders (AUD) and other substance use disorders is alarmingly high, and long-term success rates of smoking cessation interventions in this group are low. One way to improve treatment efficacy for this population is through a more comprehensive understanding of individual- and treatment-level variables that affect the motivation to quit as well as the outcomes of smoking cessation attempts. In this paper, we review the relevant research on factors that may influence readiness to quit and the efficacy of smoking cessation interventions in this population and highlight gaps in the knowledge base that require further investigation. Methods: We conducted a review of the literature on smoking among adults with AUD in order to examine predictors of motivation to quit smoking and outcome of cessation attempts. Results: No consistent predictors of motivation for smoking cessation were identified. Although the results were not unanimous, a greater length of abstinence from alcohol and other substances predicted smoking cessation success. Conclusions: Empirical work identifying factors associated with the motivation and ability to quit smoking among individuals with AUD is in its early stages. Mixed results and a dearth of research in this area prohibit strong conclusions from being made. Future researchers are encouraged to consider alternative methods of conceptualizing and measuring motivations to quit in this group and to routinely include analyses that examine predictors of outcome in intervention studies.

INTRODUCTION

Although the overall prevalence of cigarette smoking has been decreasing in recent years (Molarius et al., 2001), tobacco use is endemic among individuals with alcohol use disorders (AUD) and other substance use disorders. Estimates of the prevalence of smoking derived from AUD treatment samples generally fall in the range of 70–95% (Burling and Ziff, 1988; Batel et al., 1995; Hurt et al., 1996), and this population tends to smoke more heavily, be more dependent on nicotine, and have lower quit rates than smokers without AUD (Marks et al., 1997; Lasser et al., 2000; Novy et al., 2001). Theories abound to explain this high degree of overlap between nicotine dependence and alcohol abuse or dependence, including a similar genetic predisposition (Madden and Heath, 2002), the use of one substance to enhance the reinforcing effects of the other (Kouri et al., 2004), or the capacity of one substance to reduce the unpleasant effects of the other (Kalman, 1998). Although the mechanisms underlying the substantial comorbidity are not entirely clear at this time, it is abundantly clear that the concurrent use of tobacco and alcohol represents a significant and preventable risk factor for disease and early death, particularly given the evidence that the risks of combined use are multiplicative instead of merely additive in the case of cancers of the esophagus, larynx, and liver (Talamini et al., 2002; Lee et al., 2005; Marrero et al., 2005).

Prior to an explosion of research in the early 1990s, the topic of cigarette smoking among individuals with AUD was largely overlooked by investigators and addictions professionals alike. An often-cited justification for the historical failure to address nicotine dependence in the context of AUD treatment was that substance abusers were simply not interested in quitting smoking. Recent research has effectively debunked this myth, however, demonstrating that the majority of smokers with AUD are interested in quitting at some point during their recovery (Sees and Clark, 1993; Irving et al., 1994; Ellingstad et al., 1999). Knowledge about factors associated with greater readiness to change smoking behaviour is quite limited, however.

Another broad gap in this area of literature is in the identification of individual- and treatment-level variables that predict smoking cessation outcomes among individuals who use nicotine along with alcohol. Given the generally disappointing long-term quit rates observed in the AUD population (Prochaska et al., 2004), identification of factors that influence both short- and long-term treatment outcomes becomes critical to the task of developing more effective interventions that are best matched to the characteristics of the individuals receiving treatment. Unfortunately, such factors are often not evaluated in a systematic fashion and/or reported in the results of clinical trials of pharmacological and behavioural smoking cessation treatments.

In this critical review, we sought to determine whether there are reliable predictors of: (i) motivation to quit smoking; and (ii) smoking cessation treatment outcome in an AUD population. In synthesizing this body of research, we also identify important gaps in the knowledge base and provide suggestions for further research.

METHOD

In order to locate studies that examined factors related to motivation to quit smoking and treatment outcomes among smokers with AUD, we conducted a literature search using PubMed (1950–present) and PsychINFO (1967–present), entering combinations of three categories of keywords: those related to...
smoking (i.e. smoking, tobacco, nicotine), initiation of smoking abstinence (i.e. quit, cessation), and concurrent alcohol use disorders (i.e. alcohol abuse/dependence). We then examined the bibliographies of articles located in the original search to locate additional relevant studies. We limited our search to articles that focused on the adult population of AUD smokers and were published in peer-reviewed, English language journals. Studies that examined changes in smoking status

| Author(s) | Measure of motivation | Sample | Model | Predictors/correlates examined (* = significant) | Predictors/correlates of higher motivation*
|-----------|----------------------|--------|-------|-----------------------------------------------|-----------------------------------------------
| Bobo et al. (1996a) | Made a quit attempt | N = 90; residential; male: 74%; M cigs/day: NR; alcohol with or without drug | MV | Stage of readiness* Years of daily smoking Cigarettes per day Level of nicotine dependence* Decisional balance scale scores | Higher stage of readiness Lower level of nicotine dependence |
| Bobo et al. (1996b) Study 2 | Stage of change | N = 461; outpatient; male: 62%; M cigs/day: NR; alcohol, drug use NR | UV | Gender Level of nicotine dependence Cigarettes per day Alcohol problem severity | None |
| Bobo et al. (1996b) Study 3 | Stage of change | N = 90; inpatient; male: 74%; M cigs/day: NR; alcohol, drug use NR | UV | Gender Level of nicotine dependence Alcohol problem severity | None |
| Hitsman et al. (2002) | Readiness ladder | N = 253; outpatient; male: 59.9%; M cigs/day: 27.5; alcohol | MV | Gender Days since last drink of alcohol Depressive symptoms Level of nicotine dependence Interaction of depressive symptoms X days since last drink* | Higher number of days since last drink, only among those with low depressive symptoms |
| Joseph et al. (2004a) Intent to quit in next month; Contemplation Ladder | | N = 499; inpatient; male: 69%; M cigs/day: 25.5; alcohol with or without drug | UV + MV | Age* Gender Marital status Education Employment Race/ethnicity* Cigarettes per day Level of nicotine dependence Years of smoking* Longest past abstinence Number of prior quit attempts* AUD treatment episodes Polysubstance abuse/dependence Depressive symptoms* Current/lifetime major depression | Older age Non-Caucasian Fewer years of smoking Higher number of prior quit attempts Less depressive symptoms |
| Martin et al. (2006) | Contemplation Ladder | N = 198; inpatient; male: 59%; M cigs/day: 23.8; alcohol with or without drug | MV | Gender Longest past abstinence* Years smoking 10+ cigarettes per day Cigarettes per day Level of nicotine dependence Number of days of drug use Percent drinking days Alcohol problem severity Depressive symptoms Barriers to quitting* Quitting self-efficacy* | Longer past abstinence Fewer barriers to quitting Higher quitting self-efficacy |
Table 1. (Continued)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Measure of motivation</th>
<th>Sample</th>
<th>Model</th>
<th>Predictors/correlates examined (* = significant)</th>
<th>Predictors/correlates of higher motivation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seidner et al. (1996)</td>
<td>Accepted treatment</td>
<td>n = 100; inpatient; male: 96%; M cigs/day: 16.9; alcohol and/or drug</td>
<td>UV + MV</td>
<td>Age* Gender Race/ethnicity Marital status Education Psychiatric comorbidity Age of smoking initiation Years of smoking Pack years Number of prior quit attempts Weeks of past smoking abstinence* Cotinine/creatinine ratio CO level Level of nicotine dependence Smoking-related physical problems* Primary substance of abuse or dependence Years using primary substance Number of inpatient treatments Previous alcohol/drug quit attempts Reasons for quitting Quitting self-efficacy Beliefs about consequences of trying to quit Beliefs about best time to quit* Confidence in ability to remain sober</td>
<td>Younger age More smoking-related physical problems Belief that inpatient treatment is the best time to quit smoking Fewer weeks of past smoking abstinence</td>
</tr>
<tr>
<td>Unrod et al. (2004)</td>
<td>Quit attempts (retrospective)</td>
<td>N = 120 outpatient male: 90%; M cigs/day: 21.3 alcohol and/or drug</td>
<td>UV</td>
<td>Psychiatric comorbidity*</td>
<td>Presence of comorbidity</td>
</tr>
</tbody>
</table>

Note: NR, not reported; UV, univariate (predictors tested one at a time); MV, multivariate (multiple predictors tested in the same model).

*Based on univariate model only if multivariate model was not tested.

only as a secondary outcome of treatment for psychiatric disorders or for alcohol use disorders were excluded, as these investigations tend to be less methodologically rigorous in the assessment of smoking (e.g. exclusive reliance on self-report of smoking, no attempt to verify smoking abstinence biochemically or through collateral informants) than in the assessment of alcohol use and psychiatric symptoms. Studies that focused primarily on smokers with drug use disorders who were involved in methadone maintenance treatment were also excluded due to the potential influence of methadone on smoking behaviour. However, because studies that obtain a diagnostically pure sample of individuals with AUD are quite rare, we did include studies that utilized heterogeneous samples of individuals with an AUD and/or other substance use disorders (SUD).

For the purpose of this review, we elected to use a very inclusive definition of motivation in order to prevent the omission of potentially noteworthy findings that did not fit well into a particular theoretical framework of motivation. Thus, we defined motivation to quit smoking as either a behaviour (i.e. making an actual quit attempt, choosing to accept smoking cessation treatment) or a self-reported desire or intent to quit. Using the search methods described above, we located ten studies that focused on alcohol and other substance misusers motivation to quit smoking. Two of these studies (i.e. Clarke et al., 2001; Shadel et al., 2005) were excluded due to an exclusive focus on a drug-dependent patient population, resulting in a total of eight studies for this review (See Table 1).

In choosing studies that examine predictors of smoking cessation treatment outcome, we limited our search to randomized, controlled trials of interventions to assist patients with AUD to quit smoking. We located 22 randomized, controlled trials that focused on smoking cessation interventions in this population. Of those 22, we excluded five due to a primary focus on smokers with drug abuse/dependence (Story and Stark, 1991; Campbell et al., 1995; Shoptaw et al., 2002; Haug et al., 2004; Stein et al., 2006) and one due to its focus on smoking cessation as a secondary treatment outcome ( Cornelius et al., 1999). Of the 16 remaining studies, 12 did not include analyses of predictors or moderators of treatment outcome in the original article (Burling et al., 1991; Hughes, 1993; Hurt et al., 1995; Martin et al., 1997; Bobo et al., 1998; Hayford et al., 1999; Burling et al., 2001; Gariti et al., 2002;
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Rohsenow et al., 2002; Grant et al., 2003; Hughes et al., 2003a, 2003b). Combining the studies that did examine predictors of smoking cessation in the original article with studies that were published later using data from the original trial, a total of seven studies were located for the review (Patten et al., 1998; Kalman et al., 2001; Patten et al., 2001; Patten et al., 2002; Burling and Burling, 2003; Kalman et al., 2004; Joseph et al., 2004b). We also considered a portion of the results of the Prochaska et al. (2004) meta-analysis along with these seven studies (see Table 2) as data for the present review. Although the primary focus of that meta-analysis was to determine the efficacy of smoking cessation treatment for substance misusers, the authors also reported a comparison of treatment effects for individuals in addictions treatment versus recovery, an analysis that provides relevant information for this review.

Due to the heterogeneity of the studies included in the review and consequent concerns about the appropriateness of using meta-analytic techniques for synthesis of results, we chose to conduct a qualitative review of the literature rather than a meta-analysis. We do, however, report quantitative data on the proportion of studies that demonstrate relationships between the variables of interest. Although this approach also has its limitations (e.g. quality of study design and sample size are not factored into the data), it provides a starting point for examination of trends across studies and is consistent with the primary goals of this review, which are to organize the current literature and identify areas that require further study. In the sections that follow, we limit our discussion of significant findings to predictors that have been examined in more than one study, as only one set of results is likely to prove unreliable.

RESULTS

Factors associated with motivation to quit smoking

Table 1 provides an overview of the eight studies that focused on predictors of quit attempts or readiness to quit smoking in the AUD population and met criteria for inclusion in the review.

Demographics. Gender (significant in 0 of 6 studies), education (significant in 0 of 2 studies), and marital status (significant in 0 of 2 studies) all showed little or no relationship with motivation to quit smoking. Results were more mixed for age (significant in 2 of 3 studies, but the direction of the relationship differed between the studies) and race/ethnicity (significant in 1 of 2 studies).

Smoking-related factors. Smoking-related factors did not consistently predict motivation to quit. Length of abstinence in past quit attempts predicted motivation in two of three studies in which it was included (Seidner et al., 1996; Martin et al., 2006), but the nature of the relationship differed between the studies. There is minimal or no evidence that self-reported level of nicotine dependence (significant in 1 of 7 studies), number of cigarettes smoked per day (significant in 0 of 4 studies), or years of smoking (significant in 1 of 4 studies) are related to readiness to quit smoking.

Alcohol- and drug-related factors. Neither alcohol problem severity (significant in 0 of 4 studies) nor number of previous treatments and/or attempts to quit drinking and using drugs (significant in 0 of 2 studies) have been empirically linked to readiness to quit smoking in any of the studies in which they were investigated as predictors.

Psychiatric comorbidity. The presence of psychiatric comorbidity in smokers with AUD was not found to be a consistent predictor of motivation to quit smoking. Depression, which has been the primary focus in the majority of these studies, does not appear to predict motivation by itself (significant in 1 of 3 studies), but it did interact with length of abstinence from alcohol to predict readiness to change in one study (Hitsman et al., 2002).

In addition to these studies of depression, two studies have also investigated the associations among multiple psychiatric comorbidity variables (e.g. presence of a psychiatric condition outside of substance-related disorders, number of psychiatric diagnoses) and motivation to quit smoking. In one study, psychiatric comorbidity did not differentiate treatment acceptors from treatment refusers (Seidner et al., 1996). In the other study, a greater percentage of participants with any comorbid psychiatric diagnosis (i.e. a mood disorder, anxiety disorder, and/or posttraumatic stress disorder) made a quit attempt during the 6-month follow-up period than participants with substance use disorders only (54% vs 33%) (Unrod et al., 2004).

Factors associated with smoking cessation treatment outcomes

In this section, we consider a range of individual-level and treatment-level factors related to the outcome of randomized, controlled trials conducted to determine the efficacy of smoking cessation interventions for individuals with AUD. Details of the seven studies that have examined predictors of treatment outcomes in these trials are provided in Table 2.

Demographics. Age (significant in 0 of 2 studies) and gender (significant in 0 of 2 studies) were not consistent predictors or moderators of treatment outcome in the reviewed studies.

Smoking-related factors. Level of nicotine dependence (significant in 1 of 3 studies) did not consistently predict outcome or moderate the effects of treatment.

Alcohol- and drug-related factors. The only alcohol- and drug-related factor that has been examined as a predictor of outcome in more than one study is the length of abstinence. Two studies that have included this variable as a potential predictor produced mixed findings. That is, one reported that a greater length of abstinence from alcohol predicted better cessation rates from treatment involving nicotine replacement and behavioural interventions (Kalman et al., 2004) whereas the other found that length of alcohol abstinence did not predict short- or long-term smoking outcomes (Patten et al., 2001).

The results of Prochaska et al. (2004) meta-analysis provide strong evidence for a relationship between the length of abstinence from alcohol and the smoking cessation success, however. In this meta-analysis of the outcomes of randomized, controlled trials of smoking cessation interventions for individuals in treatment for (N = 1410) or recovery from (N = 638) alcohol and other substance use disorders, the authors found that smoking cessation efforts tend to be more productive among individuals in recovery (with mean length
of abstinence ranging from four to eight years across the studies included in the meta-analysis that reported this data) as opposed to patients actively enrolled in substance abuse treatment programs (where length of abstinence was not reported per se, but most individuals were enrolled within weeks of admission). Specifically, cessation rates were over three times as high for those in recovery versus treatment (38% vs 12%).

**Psychiatric comorbidity.** Depression was not identified as a significant predictor of outcome (significant in 0 of 2 studies), although it did interact with the type of treatment in one study (Patten et al., 2002) such that behavioural smoking cessation counseling involving cognitive-behavioural therapy (CBT) for mood management was more effective in improving cessation rates for individuals with high versus low depressive symptoms.

**Timing of the smoking cessation intervention.** The timing of smoking cessation intervention during the course of treatment for AUD was not found to be related to smoking cessation success (significant in 0 of 2 studies).

**DISCUSSION**

Based on results from the eight studies that have examined predictors of motivation to quit smoking in an AUD population (see Table 1), no variables have been found to predict motivation consistently (i.e. significant in more than one study

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Intervention(s)</th>
<th>Control condition</th>
<th>Outcome factor(s) examined (* = significant)</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burling and Burling (2003); Burling et al. (2001)</td>
<td><em>N</em> = 191; inpatient; male: 100%; M cigs/day: 17.2; alcohol, with or without drug</td>
<td>NRT + 1 of 2 behavioural counseling adjuncts (standard vs emphasis on generalization to drugs and alcohol) Format: individual Approx. contact hours: 4–6</td>
<td>Usual care (no treatment offered, but behavioural and pharmacological treatment available through hospital if desired)</td>
<td>Level of nicotine dependence*</td>
<td>Lower levels of nicotine dependence were associated with better rates of continuous abstinence among those who received treatment</td>
</tr>
<tr>
<td>Joseph et al. (2004b); Joseph et al. (2003)</td>
<td><em>N</em> = 499; inpatient; male: 69%; M cigs/day: 25.5; alcohol, with or without drug</td>
<td>NRT + stage-based motivational/behavioural counseling; Format: individual Approx. contact hours: NR, varied according to stage of change</td>
<td>Same intervention, treatment delayed by 6 months</td>
<td>Treatment timing (concurrent vs delayed)</td>
<td>Timing did not affect smoking cessation success</td>
</tr>
<tr>
<td>Kalman et al. (2001)</td>
<td><em>N</em> = 36; residential; male: 100%; M cigs/day: NR; alcohol, with or without drug</td>
<td>NRT + behavioural counseling; Format: individual Approx. contact hours: 2</td>
<td>Same intervention, treatment delayed by 4 weeks</td>
<td>Treatment timing (concurrent vs delayed)</td>
<td>Timing did not affect smoking cessation success</td>
</tr>
<tr>
<td>Kalman et al. (2004)</td>
<td><em>N</em> = 130; outpatient or not in treatment, past history; male: 84%; M cigs/day: NR; alcohol, with or without drug</td>
<td>High-dose nicotine patch therapy (42 mg) + behavioural counseling Format: group Approx. contact hours: 5</td>
<td>Standard-dose nicotine patch therapy (21 mg) + behavioural counseling</td>
<td>Dose of treatment Level of nicotine dependence Longest past smoking abstinence Length of alcohol abstinence* Depressive symptoms History of major depression Treatment X level of nicotine dependence</td>
<td>No significant difference in smoking outcomes between high and standard dose Longer alcohol abstinence was the only sig. predictor of successful cessation</td>
</tr>
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</table>
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Table 2. (Continued)

<table>
<thead>
<tr>
<th>Authors</th>
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<th>Intervention(s)</th>
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<th>Outcome factor(s) examined (* = significant)</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patten et al. (2002)</td>
<td>N = 49; community, past history; male: 52.9%; M cigs/day: NR; alcohol, with or without drug</td>
<td>Behavioural smoking cessation counseling + CBT for mood management</td>
<td>Behavioural smoking cessation counseling</td>
<td>Depressive symptoms Treatment X depressive symptoms*</td>
<td>Sig. treatment X depressive symptoms interaction: CBT worked better for high versus low depression; behavioural smoking counseling worked better for low versus high depression</td>
</tr>
<tr>
<td>Patten et al. (2001); Martin et al. (1997)</td>
<td>N = 205; community, past history; male: 55.1%; M cigs/day: 28.1; alcohol, with or without drug</td>
<td>Behavioural counseling + 1 of 2 conditions: physical exercise or nicotine gum</td>
<td>Standard treatment (i.e. behavioural counseling)</td>
<td>Age Gender Marital status Education Level of nicotine dependence Cigarettes per day Years of smoking Prior quit attempts Longest past smoking abstinence Years of alcohol abstinence Drug use history Weekly AA meetings Having AA sponsor All interactions with treatment</td>
<td>Longer past smoking abstinence predicted better outcome Sig. treatment X having AA sponsor interaction: standard treatment worked better with AA sponsor; experimental treatments worked better without AA sponsor</td>
</tr>
<tr>
<td>Patten et al. (1998); (subsample of Patten et al., 2002)</td>
<td>N = 29; community, past history; male: 48.3%; M cigs/day: 30.2; alcohol, with or without drug</td>
<td>Same as above</td>
<td>Same as above</td>
<td>Age Gender</td>
<td>Neither age nor gender predicted outcome</td>
</tr>
</tbody>
</table>

Meta-analysis

| Prochaska et al. (2004) | N = 19 RCTs; in addictions treatment or recovery; alcohol and/or drug | N/A | N/A | Length of alcohol/drug abstinence* | Higher quit rates observed in recovery versus addictions treatment |

Note: NRT, nicotine replacement therapy; NR, not reported; RCT, randomized; controlled trial.

and correlated in the same direction across studies). Some mixed results were noted, and in each of those cases, the mixed findings may be attributable to differences between the studies in the measure of motivation used (e.g. self-reported stage of change versus accepting smoking cessation treatment or making a quit attempt). These mixed findings highlight the critical gap between expressing a desire or intent to change and actually initiating an attempt to quit smoking, a gap that is often the target of motivational interventions designed to move individuals toward taking action (e.g. motivational interviewing; Miller and Rollnick, 1991).

There are several variables that have been investigated more extensively and have shown little or no relation to readiness to quit smoking in individuals with AUD. Gender, for example, has been examined as a predictor of motivation in six studies and has not been significant in any of those six. Likewise, seven studies have included self-reported level of nicotine dependence as a predictor, and six of the seven have found no relationship between this variable and motivation to quit smoking. Clearly, however, the area of research examining predictors of readiness to quit and actual quit attempts among smokers with AUD is in its early stages, and conclusions made on the basis of existing studies should be considered tentative at best.

A number of factors have been investigated as sources of variability in the efficacy of smoking cessation treatment for
smokers with AUD. On the individual level, length of abstinence from alcohol (and other substances) appears to be the only consistent predictor of smoking cessation success, particularly given the strength of the evidence provided in the Prochaska et al. (2004) recent meta-analysis. The effect of smoking intervention timing was the only treatment-related variable that has been evaluated in multiple studies, and timing does not appear to significantly influence abstinence rates. In addition to smoking outcomes, however, other important factors that should be taken into consideration when determining the optimal timing for nicotine dependence treatment among individuals with AUD include: (i) the willingness of smokers to participate in treatment at that time; and (ii) the possibility of increased risk for alcohol and drug relapse.

In both studies involving the timing of the intervention, smokers were significantly more likely to participate in nicotine dependence treatment when it was offered concurrently with treatment for alcohol abuse or dependence as opposed to when it was delayed (Kalman et al., 2001; Joseph et al., 2004b). Likewise, the results of the majority of studies that have examined the risk of alcohol and drug relapse associated with smoking cessation suggest that concurrent treatment does not increase the probability of relapse (Burling et al., 1991; Martin et al., 1997; Bobo et al., 1998; Patten et al., 1998; Burling et al., 2001; Kalman et al., 2001; Gariti et al., 2002; Rohsenow et al., 2002; Haug et al., 2004). In the two studies that have shown evidence of greater relapse risk among those receiving concurrent treatment for alcohol/drug use disorders and smoking cessation, differences between treatment and control groups in terms of alcohol and/or drug use were not consistently observed across all time points and all measures (Grant et al., 2003; Joseph et al., 2004b).

Limitations
As in any literature review, either qualitative or quantitative, the heterogeneity of the methods used in the included studies complicates the synthesis and interpretation of the findings. In addition to this overarching limitation, we are also aware of a few limitations that are specific to our review. First, each of the behavioural and cognitive variables that we chose to utilize as indicators of motivation for smoking cessation (i.e. quit attempts, enrollment in a cessation program, and self-reported readiness to quit) has unique strengths and limitations when used for this purpose. Examining the combined results of the sparse extant research, then, is further complicated by the diversity of approaches to the motivational construct. Second, the results of predictive analyses are highly sensitive to the variables included in the model, and these variables are far from standardized across studies. Third, in choosing to limit our sample of studies examining predictors of successful quitting to randomized, controlled trials of smoking cessation interventions, we omitted investigations of spontaneous smoking cessation or reduction occurring during AUD treatment (e.g. Friend and Pagano, 2005; Johnson et al., 2005; Karam-Hage et al., 2005) that also have the potential to shed some light on factors affecting motivation to quit smoking and the outcome of quit attempts. Finally, there is a possibility that publication bias may have affected the results of the review. Although we could have employed the technique of surveying colleagues who are actively working in this area to obtain ‘file drawer’ studies with null findings in order to evaluate and reduce the possibility of publication bias, this method is not without its own forms of bias (e.g. limited response to requests for studies, obtaining a non-representative sample of unpublished studies). As such, we chose to report only the results of published studies in this area.

Directions for further research
In terms of AUD smokers’ motivation to quit smoking, more research is needed to clarify how individual differences affect readiness to change and to determine the conditions under which motivation is maximized. In particular, more prospective studies such as the one conducted by Bobo et al. (1996a) would be useful in evaluating predictive models, as most of the studies of motivation to quit smoking relied exclusively upon retrospective or cross-sectional data to determine readiness to change. Although previous studies such as the one conducted by Bobo et al. (1996a) have established a relationship between self-reported intent to change and an actual change in behaviour, it is obvious that the correlation between intent and execution will never be perfect with respect to smoking cessation or any other behavioural change. As such, studies that examine only self-reported intent to change provide limited information about the process of initiating a quit attempt.

In addition to further research examining correlates of motivation, we also encourage further investigation into AUD smokers’ identified reasons for quitting smoking. Most of the current research on motivation for smoking cessation in this group focuses on the degree of motivation (e.g. stage of change) rather than on the nature of the motivation (i.e. specific reasons for wanting to quit). Surprisingly few studies have asked AUD smokers about their reasons for quitting, and these investigations (Irving et al., 1994; Burling et al., 2001) utilized a standardized measure (i.e. Reasons for Quitting Scale; Curry et al., 1990) that has not been validated with AUD smokers. Because there may be reasons for quitting that are unique to the AUD population (e.g. desire to be free from all addictions, belief that smoking will increase the likelihood of relapse, advised by an addictions treatment professional), there is a need for both qualitative and quantitative research to shed further light on the nature of AUD smokers’ motivations to stop smoking.

As mentioned previously, only approximately half of the small number of randomized, controlled trials conducted to determine the efficacy of smoking cessation interventions in an AUD population have examined factors that are correlated with treatment outcome. As such, many uncertainties remain about both individual-level and treatment-level variables that may influence the success of nicotine dependence treatment. For example, there is a high rate of psychiatric comorbidity in the AUD population (Shivani et al., 2002), but depression is the only form of psychiatric comorbidity that has been examined in relation to the efficacy of smoking cessation interventions. As such, it is unclear how other forms of psychiatric comorbidity that are common in this population, such as anxiety disorders or antisocial personality disorder (Shivani et al., 2002), influence the outcome.
of smoking cessation attempts. On a similar note, there is some initial evidence that diagnostic heterogeneity (i.e.
variability in the primary substance of abuse or dependence) is associated with smoking behaviour such that individuals with
alcohol abuse or dependence diagnoses smoke more heav-
ily and are more nicotine dependent than individuals with
drug abuse/dependence diagnoses (Burling and Ziff, 1988),
yet there has been little attention to the issue of diagnostic
heterogeneity as a predictor or moderator of treatment out-
come. Finally, although self-efficacy has been examined as a
predictor of motivation to quit smoking in some studies with
AUD smokers (Seidner et al., 1996; Martin et al., 2006), it
has yet to be evaluated as a moderator or mediator of treat-
ment outcome in this population.

Also, because only one randomized, controlled trial to
date has focused the influence of treatment dosage on out-
come (Kalman et al., 2004), further examination would be
beneficial in order to determine the optimal dosage of
pharmacological treatments as well as the most effectual
intensity of behavioural forms of treatment. In addition,
there are several treatment-related variables that have not
received any empirical attention in terms of their influence
on smoking outcomes, such as the format of the smoking
cessation intervention (i.e. group vs individual), the type of
treatment provider (e.g. health care professional vs mental
health care professional), and characteristics of the treatment
environment (e.g. percentage of staff who smoke, whether
smoking cessation is voluntary vs mandatory).

CONCLUSION

The purpose of this review was to summarize research find-
ings that examine factors associated with motivation to quit
smoking and smoking cessation outcomes among individuals
with AUD. By identifying these factors, a minimum of two
important objectives can be achieved: (i) identifying char-
acteristics of AUD smokers who may be most responsive
to smoking cessation interventions, and (ii) developing more
effective interventions for a population of smokers for whom
quitting can be very difficult.

The recent resurgence of interest in studying nicotine
dependence and its treatment among individuals with AUD is
certainly promising, as it offers hope of increasing our un-
derstanding of this dual addiction and its treatment. In
addition, the methodological soundness of more recently
published studies and the use of larger, more diagnostically
diverse samples of individuals with AUD are also signs that
this area of research is advancing. At the same time, we are
also aware of several methodological weaknesses that are
shared by many of the studies described in this review. One
weakness is in the oversampling of individuals in addictions
 treatment for studies that examine the readiness to quit and
smoking cessation outcomes of smokers with AUD. Although
this population may be more accessible and/or more interested
in quitting smoking than the population of smokers who are
not receiving any form of treatment for AUD, it nonetheless
brings into question the generalizability of the study findings
to nonclinical populations. Small sample size is another
frequently-occurring methodological limitation that can have
a significant impact on study results by precluding analyses
of potential moderators of treatment efficacy and producing
unreliable findings related to the predictors of motivation to
quit smoking among individuals with AUD.

Because the topic of smoking among individuals with
AUD has historically received minimal clinical or empiri-
cal attention, much work remains to be done with respect
to understanding the range of biological, psychological, and
social/contextual factors that may influence the development,
course, and treatment of nicotine dependence in this popula-
tion. Only a sincere and sustained research effort will bring
these factors to light, and the field appears to be moving in
that direction currently. As evidence of this increased focus
on the issue of comorbid nicotine dependence and AUD, we
noted that the majority of the randomized, controlled trials
located for this review that examined the efficacy of smok-
ing cessation interventions for individuals with AUD were
published within the past 5 years. As such, we are optimistic
that future reviewers of this area of research will have access
to new findings that will allow them to develop a compre-
hensive model of factors that affect the smoking behaviour,
readiness to quit, and success of nicotine dependence inter-
ventions among individuals with AUD.

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