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Would smokers with schizophrenia benefit from a more flexible approach to smoking treatment?

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ABSTRACT

We evaluated literature that addresses the notion that flexible smoking treatment approaches are warranted for smokers with a diagnosis of schizophrenia. Understanding the biological and psychological mechanisms that increase the likelihood of smoking and decrease the motivation to quit for these individuals is addressed within the framework of a neurobiological model. We provide a brief overview of the limited smoking cessation treatment literature for patients with schizophrenia and compare abstinence-focused versus reduction-focused treatment modalities. The potential utility of the reduction-focused approach to tobacco treatment for these smokers is evaluated. Suggestions for future research to address the utility and efficacy of reduction-focused interventions for smokers with schizophrenia are put forth. We conclude with a consideration of the implications for the current understanding of smoking treatment among patients with co-morbid psychiatric diagnoses.

KEYWORDS Harm reduction, nicotine dependence, schizophrenia.

INTRODUCTION

Adult smoking prevalence rates have leveled off within the United States (Emmons *et al.* 1997). Studies suggest that today's US smoking population may largely represent individuals with co-morbid psychiatric problems (Gilbert & Gilbert 1995). People with psychiatric illnesses tend to smoke cigarettes at high rates with some, but not all, co-morbid subgroups appearing more resistant to contemporary smoking treatments compared with their counterparts who lack such vulnerability (Hughes 1999). Treatment efforts have used patient-matching approaches in which treatments were tailored to the presenting psychiatric symptoms. Treatment programs tailored to individuals prone to depression have been studied with the greatest frequency (Hall *et al.* 1996; Hayford *et al.* 1999; Hitsman *et al.* 1999). Few studies have examined whether modified smoking treatment approaches promote abstinence for smokers with co-morbid schizophrenia, a subgroup that reports unusually high rates of smoking (Masterson & O'Shea 1984; Hughes *et al.* 1986) and extreme difficulty stopping smoking (Lavin *et al.* 1996).

Approximately 1% of the US population has been diagnosed with schizophrenia (American Psychiatric Association 1994) and at least 70% of these individuals smoke cigarettes (De Leon *et al.* 1995). Unfortunately, efforts to promote long-term abstinence among patients with schizophrenia is not well documented. Treatment studies present evidence that few patients with schizophrenia are able to obtain short-term smoking abstinence (Addington *et al.* 1997; Ziedonis & George 1997). A number of these studies suggest that neurobiological factors associated with schizophrenia interact with nicotine to reduce the likelihood of smoking abstinence (Dalack *et al.* 1998). This paper explores whether patients with schizophrenia need to change smoking behavior at a slower rate and require greater reinforcement for

change in order to compensate for any abnormal neuro-biological factors that may in fact exist to undermine quit attempts. Our review of the literature suggests that an alternative smoking treatment approach for people with co-morbid schizophrenia may reflect a model that builds skills and prompts abstinence once a lower rate of smoking has been obtained and stabilized over time.

The present paper will focus on research examining excessive smoking within populations diagnosed with schizophrenia. In conducting our review, we performed a computer search consisting of PsychLit (1971–2000) and Medline (1966–2000) databases, using the search terms 'schizophrenia' and 'smoking' to identify research reports for this paper. We then selected papers from peer-review journals or chapters written by prominent researchers in the area of neurobiology, schizophrenia, and/or cigarette smoking.

For the purposes of this paper, we restricted our review to studies examining smokers diagnosed with schizophrenia and/or schizoaffective disorder. The *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV) (American Psychiatric Association 1994) makes the differential diagnosis of schizoaffective disorder from the diagnosis of schizophrenia in two primary ways. Individuals who meet the criteria for schizoaffective disorder have a diagnosable mood disorder (e.g. major depression) concurrent with symptoms associated with the active phase of schizophrenia (e.g. delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior and/or negative symptoms). Delusions or hallucinations for at least 2 weeks in the absence of prominent mood symptoms must also be present. No apparent differences exist in smoking treatment approaches for individuals with these psychotic subtypes, nor does it appear that such individuals differ in their smoking behavior. Moreover, because researchers who examine individuals with co-morbid psychotic disorders and nicotine dependence typically do not differentiate between schizophrenia and schizoaffective disorder, we will use the term 'schizophrenia' to reflect individuals who carry the diagnosis of schizophrenia or schizoaffective disorder.

TOBACCO USE DISORDER AND SCHIZOPHRENIA: A NEUROBIOLOGICAL MODEL

Two percent of the adult US smoking population report suffering from schizophrenia (Hughes 1999). On average, smokers diagnosed with schizophrenia smoke more cigarettes per day and have longer smoking histories than smokers without current or past psychiatric ill-nesses. After daily cigarette intake has been statistically controlled, continine levels remain significantly higher for smokers with schizophrenia compared with ones without psychiatric illnesses (Onlincy *et al.* 1997). Moreover, combined smoking treatments (behavioral and pharmacological interventions) are relatively ineffective in promoting long-term abstinence for smokers with schizophrenia. The few published treatment trials, combining intensive cognitive–behavioral therapy with nicotine replacement, produce modest 6-month abstinence rates (12–17%) (Ziedonis & George 1997; Addington *et al.* 1998; George *et al.* 2000).

Researchers have begun to explore the potential mechanisms that explain the high co-morbidity between nicotine dependence and schizophrenia (De Leon *et al.* 1995). Although patients with schizophrenia appear to smoke for many of the same reasons as smokers who lack psychiatric diagnoses (Glynn & Sussman 1990), other evidence suggests that their psychiatric illness bolsters the vulnerability to nicotine dependence. Among several possible explanations (Dalack *et al.* 1998), the most common assumption is that nicotine alleviates certain psychiatric symptoms (Gilbert & Gilbert 1995; Ziedonis & George 1997; Hughes 1999; Picciotto *et al.* 2000). For example, smokers with schizophrenia may experience a relief from negative symptoms, schizophrenia-related cognitive dysfunction, and/or medication side-effects (Dalack *et al.* 1998).

The assumption that patients with schizophrenia smoke to alleviate their symptoms is supported by several different, yet related, research findings. For example, nicotine may serve to remedy the worsening of negative symptoms caused by traditional antipsychotics, such as haloperidol (Gerlach & Larsen 1999; Lyon 1999). Researchers posit that the blockage of dopamine in the mesocortical and mesolimbic pathways, presumably caused by traditional antipsychotic medications, produce blunted emotions and cognitive side-effects that mimic negative symptoms (i.e. blunted affect, alogia, avolition and anhedonia) (Barnes & McPhillips 1995; Lewander 1994). It is plausible that nicotine's ability to enhance dopaminergic functioning via cigarette smoking (Benowitz *et al.* 1990), particularly along the blocked pathways, may partially diminish negative symptoms (Lyon 1999; Shimoda *et al.* 1999). It remains difficult to differentiate whether nicotine reduces negative symptoms or neuroleptic-induced deficits that mimic such symptoms. Nevertheless, the extent to which nicotine relieves some of the chronically unpleasant symptoms may help explain why patients with schizophrenia smoke heavily. Ziedonis *et al.* (1994) support this premise with their finding that patients who are regular smokers show reduced negative symptoms in comparison to non-smoking patients.

Researchers also suggest that atypical antipsychotic medications improve, rather than worsen, negative symptoms associated with schizophrenia (Llorca *et al.* 2000). Presumably, this category of antipsychotic medication influences negative symptoms along similar neurobiological pathways as nicotine. To the extent that both nicotine and atypicals improve negative symptom profiles, one might expect that nicotine would bolster the therapeutic properties of atypical medication (McEvoy *et al.* 1999) as opposed to its therapeutic reduction of traditional antipsychotic medication (McEvoy *et al.* 1991). Consistent with this notion, smokers with schizophrenia compared with their non-smoking psychiatric counterparts show more enhanced therapeutic response to atypical antipsychotics (McEvoy *et al.* 1999). Interestingly, when patients are treated with atypicals, such as clozapine, their negative symptoms improve and they smoke significantly less (George *et al.* 1995; McEvoy *et al.* 1995, 1999).

In addition, the influence of nicotine on the dopamine-blocking effects of antipsychotic medications may help buffer patients with schizophrenia from movement disorders (e.g. dystonia, tremors, rigidity and akinesia/bradykinesia). Certain antipsychotic medications, especially the traditional agents, contribute to movement disorders by blocking dopamine along the nigrostriatal pathway (Casey 1993). Although yet to be directly tested, nicotine's ability to weaken the dopaminergic blocking power of traditional antipsychotic medications may lower the risk of movement disorders.

Other data that support the self-medication hypothesis of nicotine dependence and schizophrenia include nicotine's effects on nicotinic acetylcholine receptors. Nicotinic aceylcholine receptors are implicated in the pathophysiology of schizophrenia (Dalack *et al.* 1998). Specifically, a dysfunction in acetylcholine may be responsible for signs and symptoms associated with abnormal sensory gating, such as decreased attention, difficulty with concentration and poor memory (Adler *et al.* 1992, 1993). Some postulate that nicotine's ability to improve acetylcholine functioning reflects subsequent improvement in auditory sensory gating deficits (Griffith *et al.* 1998). Thus, nicotine's alleviating effects on sensory gating deficits may enable patients with psychotic spectrum disorders to increase attention, concentration, and perhaps memory by filtering out irrelevant stimuli (Adler *et al.* 1992, 1993; Levin *et al.* 1996).

In general, neurobiological correlates linked to the proposed self-medication hypothesis represent both direct and indirect effects of nicotine, a nicotinic cholinergic agonist, on numerous neurotransmitters, including acetylcholine, dopamine and glutamate (Balfour 1989; Carmody 1992). As represented in the schematic below (Fig. 1), the proposed neurobiologically primed self-medicating behavior might be selectively reinforced by
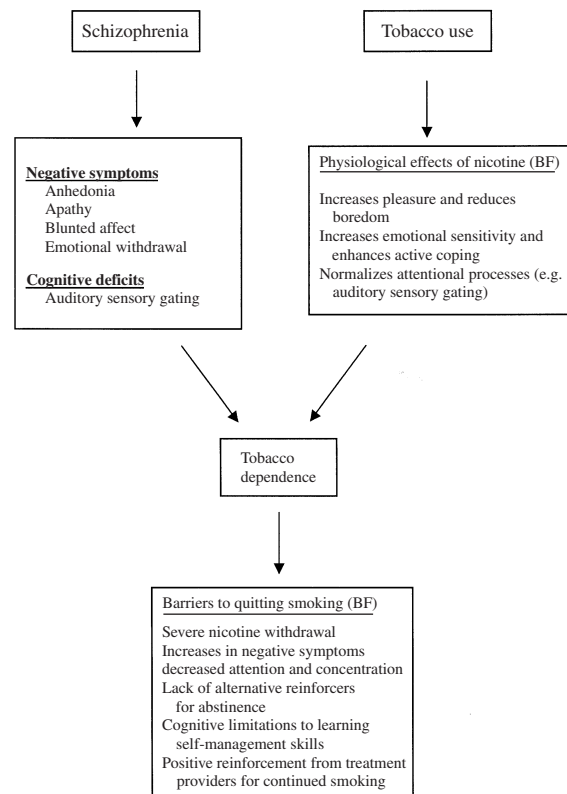

Figure 1 The effects of a proposed self-medication model as it applies to smokers with schizophrenia

reductions in various undesirable characteristics associated with schizophrenia and its subsequent treatment.

BARRIERS TO QUITTING FOR SMOKERS WITH SCHIZOPHRENIA

Patients with schizophrenia face numerous barriers that may undermine their attempts to quit smoking. For example, it is unclear whether they possess adequate motivation to achieve a smoke-free lifestyle. Nicotine's ability to alleviate aversive psychiatric symptoms may reinforce increased cigarette smoking for such patients. Furthermore, patients with schizophrenia may have few alternative reinforcers that are as effective as cigarettes in reducing adverse psychiatric symptoms and in providing a reliable source of pleasure (Eastwood 1993). Indeed, this patient population may be less motivated to discontinue a behavior so strongly associated with symptom alleviation and reward. At present, there are inconsistent results that show that patients with schizophrenia possess adequate motivation to quit smoking (Addington *et al.* 1997, 1998; Ziedonis & George 1997; Ziedonis & Trudeau 1997; Addington 1998).

It is also unclear whether patients with schizophrenia have access to the necessary supportive environment (i.e.

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Table 1 Characteristics of smoking cessation studies for patients with psychotic disorders.

Study	n	Psychotic diagnoses	Intervention(s)	6-month outcome
Ziedonis & George (1997)	24	Schizophrenia (63%) & schizoaffective disorder (37%)	10-week program: Group and/or individual nicotine replacement therapy (NRT), behavioral counseling, motivational enhancement, supportive therapy and psychoeducation	13%
Addington et al. (1998)	50	Schizophrenia & schizoaffective disorder	7-week group treatment using the American Lung Association (ALA): protocol: role-playing, anxiety reduction, positive reinforcement & NRT	12%
George et al. (2000)	45	Schizophrenia & schizoaffective disorder	7-week ALA versus 10-week specialized schizophrenia program, which includes motivational enhancement, and relapse prevention, psychoeducation, social skills training (all participants received NRT)	ALA = 17.6%* SS = 10.7%*
Evins et al. (2001)	18	Schizophrenia	12-week bupropion versus placebo + 9-week CBT psychosocial treatment	(3-month only) Smoking reduction only, no abstinence

*$p < 0.05$. Outcome reports of smoking abstinence were verified with carbon monoxide or urinary cotinine in all studies.

access to effective smoking cessation treatments and positive reinforcement from their mental health providers) that helps to promote sustained abstinence. Despite evidence to the contrary (Haller et al. 1996), many health-care professionals express concerns that restricting smoking among patients may substantially increase their aggressive behaviors or exacerbate their psychotic symptoms. Health-care professionals within many psychiatric institutions are therefore reluctant to enforce smoking control actively and/or encourage smoking cessation among such patients (Landow et al. 1995; Pearlman 1997).

Once patients with schizophrenia develop sufficient motivation to quit within an environment that supports abstinence-based efforts (Addington et al. 1997), the issue becomes whether available smoking treatments address their specific needs. Severe nicotine withdrawal symptoms along with increases in mild psychiatric symptoms and medication side-effects, once buffered by smoking, may encourage patients to resume smoking (Dalack & Meador-Woodruff 1996). In particular, patients who quit without adequate pharmacological adjuncts and/or effective self-control strategies for managing their symptoms may be at increased risk for relapse to smoking. Unfortunately, even if these patients are taught self-management skills, possible cognitive deficits (Addington & Addington 1999) may undermine their ability to acquire and access the skills important to successful quitting.

SMOKING CESSATION AND SCHIZOPHRENIA

Although some researchers advocate specific guidelines for treating smokers with co-morbid schizophrenia (Docherty et al. 1996; Addington 1998), it has been historically difficult to evaluate the efficacy of such programs. For instance, available treatment trials for smokers with schizophrenia have methodological limitations, including the heterogeneous nature of schizophrenia samples, small sample sizes, the lack of defined interventions and the lack of control groups. In addition, issues involving cognitive deficits (Addington & Addington 1999), questionable motivation (Ziedonis & Trudeau 1997) and the overall lower functioning (Dickerson et al. 1999; Harvey et al. 2000) complicate the design and development of smoking treatments targeting these individuals. Such obstacles give rise to questions as to whether individuals with schizophrenia benefit from known smoking treatment modalities, most of which are abstinence-based programs. Thus, the first step has been to test the feasibility of employing standard smoking treatment with these patients (see Table 1).

All studies report fair end of treatment retention rates of 50–94%. For the studies that were successful at prompting abstinence, results show a decline in abstinence rates from end of treatment (42–50%) to 6-month follow-up (12–17%) (Ziedonis & George 1997; Addington et al. 1998; George et al. 2000; Evins et al.

2001). Nicotine replacement therapies (NRT) and group attendance were linked (although not statistically verified) to those smoke-free at the 6-month assessment (Ziedonis & George 1997; Addington *et al.* 1998; George *et al.* 2000; Evins *et al.* 2001). For example, most subjects abstinent at 6 months received some type of NRT. In addition, there appeared to be a dose–response relationship between abstinence rates and group attendance. Within the Addington *et al.* study, people abstinent at 3 and 6 months attended all seven group sessions, those abstinent at the end of treatment attended 6.5 sessions and those who relapsed attended, on average, 5.5 sessions.

It remains unclear whether individuals with schizophrenia substantially benefit from abstinence-based smoking treatment approaches. At best, combined pharmacological (e.g. NRT) and psychosocial interventions prompt 6-month abstinence for very few patients. In addition, other studies that provided nicotine replacement (Hartman *et al.* 1991; Dalack *et al.* 1998) and sustained-release bupropion (Evins & Tisdale 1999) without concurrent psychosocial treatment have only produced reductions in smoking behavior and not abstinence. Similarly, positive reinforcement techniques without conjoint pharmacological treatments appear to be effective in reducing short-term smoking rates, but not in prompting complete abstinence from smoking (Roll *et al.* 1998). Such poor abstinence rates implicate a need for future research to continue to test new smoking treatments and to consider examining the efficacy of alternative treatment options, such as reduction-focused strategies.

REDUCTION-FOCUSED APPROACHES AND SMOKING BEHAVIOR

Aside from abstinence-focused treatment, other treatment models have been developed to allow for continued use, albeit substantially reduced usage (Marlatt 1999). The idea driving such reduction-focused approaches is that lowering daily exposure to tobacco toxicants may equally lower the risk of physical illness in those who have great difficulty quitting. Although reduction-focused models are gaining in popularity, particularly in cultures with large numbers of illicit drug users, the application of reduction principles in tobacco treatment remains extremely controversial.

Reduction-focused theorists advocate that certain products and strategies be employed to lower the morbidity and mortality risks associated with chronic exposure to tobacco toxicants (Kozlowski & Herman 1984; Kozlowski 1989; Russell 1990; Benowitz 1995; Hughes 1995; Baer *et al.* 1998). In particular, products such as the nicotine inhaler have been examined for their potential to reduce tar and nicotine exposure (Kozlowski *et al.*

1996; Hurt *et al.* 2000). Behavioral strategies have also been employed to target the reduction of smoking. Restricting access to cigarettes by banning smoking in work areas and modifying smoking behavior by positively reinforcing low carbon monoxide levels are examples of behavioral strategies that promote smoking reduction (Baer *et al.* 1998). For the most part, previous research shows the *feasibility* of reducing exposure to tobacco toxicants through reduction-focused approaches (Institution of Medicine 2001).

Some data suggest that the products that have potential for reducing smoking behavior/tobacco toxicants, with few exceptions (Pickworth *et al.* 1998), show little or no reduction in biomarkers that assess harm exposure (Kozlowski *et al.* 1996; Hurt *et al.* 2000; Institution of Medicine 2001). Researchers posit that people change their behaviors to maximize the absorption of nicotine. For instance, when smokers block cigarette filter vents of ultra-light cigarettes with their lips, their carbon monoxide more than doubles (Kozlowski *et al.* 1996). Alterations in smoking behavior were also witnessed when comparing the effects of bans on smoking in the work-place. Smokers outside banned/restricted work areas had higher numbers of puffs per cigarette and finished their cigarettes 30.4% more quickly compared with smokers in non-banned areas, such as social settings (Chapman *et al.* 1997).

However, there is some evidence of a dose–response relationship between nicotine absorption and US Federal Trade Commission (FTC) tar and nicotine yields of cigarettes (Byrd *et al.* 1998). In other words, people who normally smoke ultra-light cigarettes absorb significantly less nicotine than ones who smoke cigarettes with high tar and nicotine yields. Unfortunately, at least in the short-term, when people change from a high-yield cigarette to an ultra-light, they tend to modulate behavior to increase the level of nicotine absorbed. Future research should test (a) whether people are able to sustain/stabilize smoking reduction for prolonged periods and (b) if so, whether their initial tendency to compensate for lower nicotine levels decreases across periods of sustained reduction.

EMPIRICAL EVIDENCE SUPPORTING SMOKING REDUCTION FOR PATIENTS WITH SCHIZOPHRENIA

Research employing reduction-focused interventions has shown promise at reducing smoking or exposure to tobacco toxicants among those with schizophrenia (Barmann *et al.* 1980; Dawley *et al.* 1989; Roll *et al.* 1998). Even though patients often modulate behavior to increase nicotine absorption during short-term reduction

trials, some evidence shows decreases in the biomarkers associated with harm (e.g. lower carbon monoxide). For the purposes of this paper, we provide this evidence to show the potential use of reduction approaches for smokers with schizophrenia. However, it is important to note that studies of the effects of smoking reduction have been limited to very short-term outcomes. There is a need for trials to assess whether such outcome data may be maintained and, if maintained, whether long-term smoking reduction might reduce harm exposure and/or prompt abstinence at a later date.

There are three specific areas that may help reduce smoking behavior as well as exposure to tobacco toxicants in patients with schizophrenia. These are limiting their access to cigarettes, providing nicotine replacement and reinforcing lowered smoking rates. Some research evaluates whether limiting access to cigarettes within psychiatric settings is feasible because of the fear that smoking restrictions might foster problematic behaviors among the patient population. In particular, the effects of restricting smoking to designated areas or prohibiting smoking within psychiatric hospitals have been tested. Although various researchers delineate possible negative effects of this approach (Greeman & McClellan 1991; Hughes 1993), less than 10% of smokers with psychiatric illnesses have difficulty adjusting to these restrictions (Greeman & McClellan 1991). The ones that have the most difficulty are typically restricted from leaving the hospital environment during a smoking ban. Designating a well-ventilated smoking room with restricted hours may help to minimize the negative effects from banning smoking in an inpatient setting.

Because of the potential benefits associated with decreasing expired carbon monoxide and lowering respiratory tract inflammation from NRT (Rennaurd *et al.* 1990), researchers have also tested the feasibility and safety of smoking reduction through the use of NRT (Dalack & Meador-Woodruff 1996). The first line of evidence showed that patients with schizophrenia ($n = 13$) smoked significantly fewer cigarettes during a 48-hour assessment period while on NRT compared with a 48-hour placebo assessment period (Hartman *et al.* 1991). Dalack & Meador-Woodruff extended these findings by showing that patients ($n = 10$) were able to decrease their expired carbon monoxide levels 20% while being administered NRT (22 mg/24 hours) for 2 days. In addition, continued smoking while wearing the active patch did not result in negative sequelae. Both studies using NRT show the potential of reducing smoking rates and carbon monoxide levels among patients with schizophrenia.

Behavioral reinforcement strategies (e.g. positive reinforcement) have also been used to reduce smoking among patients with schizophrenia. Barmann *et al.* (1980) were one of the first groups to test the hypothesis

that smoking could be reduced within a day-treatment program in a psychiatric outpatient clinic. Their study utilized an ABAB design with treatment and baseline periods lasting a week in duration. Staff members were instructed to reinforce non-smoking behavior with tokens at randomly selected, unannounced times during treatment weeks. Reinforcement tokens were lapel buttons with the printed phrase, 'Thank you for not smoking'. The results indicated a 65% reduction of observed smoking behavior during treatment weeks.

Roll *et al.* (1998) assessed the utility of monetary reinforcement for smoking abstinence with nicotine-dependent outpatients with schizophrenia. An ABA design was implemented using a cumulative reinforcement schedule (after an initial payment of $3.00, subsequent payments accrued by $.50 with a maximum payment of $10.00) for CO levels lower than 11 p.p.m. during the intervention condition; subjects were assessed three times per day for 1 week. The results demonstrated a significant reduction in smoking during the intervention week compared with both baseline periods.

Tidey *et al.* (1999a, 1999b) conducted laboratory studies of tobacco use with patients meeting DSM-IV criteria for schizophrenia. In one study, six patients underwent assessments in which smokers could earn tobacco puffs or money. Patients with the diagnoses of schizophrenia responded in a manner consistent with smokers without mental illness. That is, the availability of monetary reinforcement significantly decreased the amount of smoking, especially as it became more difficult to earn cigarettes. This study points to the need to develop common reinforcement for the reduction of tobacco use. The other study investigated whether the point at which patients with schizophrenia stopped working for tobacco puffs was affected by previous abstinence. Indeed, patients worked longer when they had been deprived previously. As such, the patients stopped working for tobacco puffs at a higher breaking point when they attempted abstinence. These studies support continued, systematic exploration of the behavioral pharmacology of tobacco use in this patient population. Although the authors argue that results from non-psychiatric patients are similar, their results provide more evidence that positive reinforcement reduces smoking behavior among patients with schizophrenia.

As potential reduction techniques for smokers with schizophrenia, limiting access to smoking, replacing nicotine and modifying behavior may be useful in evaluating the potential benefits of an agenda that is not initially orientated to abstinence. However, one concern of researchers and care providers alike is that using reduction methods might produce a rebound to baseline rates of smoking once the intervention is discontinued (Hughes 2000). More research is needed to investigate

this rebound potential. If there is a greater possibility for rebounding to baseline rates of smoking, future research should examine the use of reduction as a long-term intervention. Given the high reinforcement value of nicotine for patients with schizophrenia, prolonged reduction interventions may assist in the adaptation and stabilization of lower smoking rates.

CONCLUSIONS

In this paper, we attempt to address the state of knowledge regarding the unique patterns of tobacco use among patients with schizophrenia. We demonstrate that there are many interesting, but as yet unanswered, questions regarding the problem of nicotine dependence in this population. As such, we propose the following recommendations for the potential direction of reduction approaches for smokers with schizophrenia.

Consistent with recommendations delineated by Hughes (Hughes 2000), future research directions could (a) address the feasibility of long-term maintenance of reduced smoking, (b) develop methods that combat compensatory behaviors (e.g. changes in smoking topography), (c) document the health benefits from smoking reduction and (d) investigate positive or negative changes in self-efficacy and motivation toward future abstinence as it applies to smokers with schizophrenia. Other questions that could be addressed that are specific to smokers with schizophrenia include (a) whether smoking reduction also reduces the need for higher dosages of psychiatric medications, (b) whether prolonged reduction exacerbates psychiatric symptoms and increases the likelihood of recidivism and (c) whether there are individual differences that differentiate those who would benefit from reduction-focused versus abstinence-based treatments. Lastly, although current research on smokers with schizophrenia appears to implicate the need for reduction approaches, this need has been based primarily on the low rates of abstinence following abstinence-based treatment. Further examination of abstinence-based treatments using more rigorous methodology (e.g. larger samples, adequate control groups, defined interventions) will provide data that may be helpful in the development of specific recommendations regarding patients who might be more appropriately served by reduction-focused versus abstinence-based treatments.

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