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MEDICALLY ILL SMOKERS AND PLANNING TO QUIT

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MEDICALLY ILL SMOKERS AND PLANNING TO QUIT

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
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By
Audrey Darville

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ABSTRACT OF DISSERTATION

MEDICALLY ILL SMOKERS AND PLANNING TO QUIT

Cigarette smoking is the leading cause of preventable disease and is the cause of nearly 1 in 5 deaths in the United States. The prevalence of smoking has had a leveling off effect after many years of significant decline. Certain subgroups of the population, such as those with low income and certain illnesses, continue to smoke at disproportionately high rates. Reasons for these disparities in smoking rates are complex. Developing a better understanding of the issues related to persistent smoking particularly for those with medical illness and limited access to cessation resources can help focus interventions to help these high risk smokers quit.

This dissertation includes a systematic review of the literature associated with hardcore smoking; an analysis of the reliability and validity of a self-efficacy instrument in a sample of low-SES, medically ill smokers; and the results of a cross-sectional, non-experimental study exploring the relationship between smoking-related factors and planning to quit in a sample of medically ill smokers.

A sample of 70 current and recent smokers was surveyed at a free clinic. Quitting self-efficacy was measured using an instrument not previously tested in a rural, medically ill sample. Modifications to the survey were made based on qualitative interviews with smokers and a single question measuring self-efficacy was also tested. There was a high correlation among the self-efficacy measures (Spearman's rho .99, $p < .001$) and between the longer instrument and the single question (Spearman's rho .65, $p < .001$). Each measure demonstrated acceptable reliability and validity. In the study exploring potential factors associated with planning to quit, the number of prior quit attempts and confidence to quit explained 43% of the variance in those planning versus not planning to quit.

Providing interventions focused on increasing confidence and experience with quit attempts can be effective in promoting a plan to quit in this group of smokers who, because of their medical illness, can benefit significantly from cessation. Research is needed to explore cessation outcomes when employing these targeted interventions with medically ill smokers in rural areas.

KEYWORDS: Hardcore Smokers, Tobacco Dependence, Smoking Cessation, Smoking Disparities, Tobacco Control

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MEDICALLY ILL SMOKERS AND PLANNING TO QUIT

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

Introduction

Tobacco use is a deadly chronic disease. The Centers for Disease Control (CDC) cites cigarette smoking as the cause of nearly 1 of 5 deaths in the United States (U.S.) annually (Centers for Disease Control and Prevention, 2009). Significant declines in smoking prevalence have occurred in the US over the past 30 years from a peak prevalence of over 50% for men in 1965, after which prevalence began to decline steadily (Giovino et al., 1994). However, in recent years adult smoking prevalence rates have leveled off (Centers for Disease Control and Prevention, 2010; U.S. Department of Health and Human Services, 2003). Tobacco cessation efforts may not be equally efficacious among different subgroups of smokers (Centers for Disease Control and Prevention, 2011; Hughes & Brandon, 2003). The reasons for this are complex, and may be related to a combination of physical (e.g., individual variations in nicotine dependence; Ray, Schnoll, & Lerman, 2009), psychological (e.g., mental illness co-morbidities; Ziedonis et al., 2008) and environmental (e.g., cultural factors; Unger et al., 2003) factors affecting both individuals and populations. Low perceived risk of smoking-related consequences (Ayanian & Cleary, 1999) and the presence of smoking-related illness (Gregor & Borrelli, 2011) have also been associated with persistent smoking. Cigarette smoking affects nearly every organ system in the body and the prevalence of smoking remains high, particularly for subgroups of the population, such as those with low education levels, living in poverty, and with medical or psychiatric illnesses (Centers for Disease Control and Prevention, 2010).

However, medically ill smokers can disproportionately benefit from cessation (Critchley & Capewell, 2004). Tailored and targeted interventions aimed at meeting specific physical and psychological needs can be effective in these populations (Gritz, Vidrine, & Fingeret, 2007). Overall, research on cessation with medically ill smokers has been sparse and there is a need for additional studies to explore unique characteristics and treatment recommendations for smokers who have medical illness and are persistent tobacco users (Gritz, et al., 2007).

The five chapters of this dissertation will explore quit intentions of hardcore smokers, specifically those with medical illness. In general, hardcore smokers are persons who have a relatively high level of nicotine dependence and low interest in quitting. The first chapter provides a brief discussion of the problem, an overview of the theoretical model to guide the research, and a brief summary of the remaining chapters. The second chapter presents a systematic review of the existing research literature from 1998 through January, 2012 on the issue of hardcore smoking. Inconsistent definitions of hardcore smokers in the literature are discussed. The third chapter describes the testing of an instrument to measure self-efficacy, the SEQ-12 (Etter, Bergman, Humair, & Perneger, 2000) in a sample of medically ill, rural dwelling smokers. No prior reliability and validity testing on the use of the measure with this population was found in the literature. The fourth chapter reports the main findings of a cross-sectional, non-experimental study of factors associated with planning to quit among medically ill smokers. The fifth chapter summarizes the study findings and identifies implications for further research, practice, and smoking cessation treatment policy.

Conceptual framework

The dissertation is guided by the concept of self-regulation. Self-regulation is the ability of an individual to alter their behavior (Baumeister & Vohs, 2007) and has been used as a theoretical framework in studies of smoking behavior (Scott, Beevers, & Mermelstein, 2008) and medical illness (Browning, Wewers, Ferketich, Otterson, & Reynolds, 2009). Successful self-regulation is linked to self-efficacy (Bandura, 1991) and outcome expectancies (Carver & Scheier, 1981; Rasmussen, Wrosch, Scheier, & Carver, 2006). Self-efficacy, a critical construct in self-regulation (Bandura, 1991), is a belief about the adequacy of one's capabilities to perform a certain task (Carver & Scheier, 1981). Outcome expectancies are a self-assessment of the likelihood that a certain goal will be achieved and optimism is the expectancy that a positive outcome will be achieved. The tension between one's current state and a goal state fuels a self-regulatory loop where the discrepancy between the two leads to action and movement toward change (Segerstrom, 2006). Anticipation that the goal state is desirable (optimism) and can be achieved (self-efficacy) provides motivation for changing from a current state (e.g. smoking) to a goal state (e.g. not smoking).

This tension between an actual and a desired state is similar conceptually to decisional balance as described in the Transtheoretical Model of Behavior Change (TTM; Prochaska, Velicer, DiClemente, & Fava, 1988), a stage based model which identifies characteristics of smokers as they progress to the eventual goal of maintaining successful behavior change (i.e. quitting smoking). The model originated with studies of smokers in naturalistic settings (Prochaska, et al., 1988) and has been used frequently in studies of smoking behavior. However, the TTM has been challenged and modified, particularly related to its utility in the understanding and treatment of precontemplating smokers; those with little or no interest in quitting and those with medical illness (Adams & White, 2005; Etter, 2005; West, 2005). The TTM provides little explanation as to why medically ill smokers experience disproportionately high relapse rates, greater temptations to smoke and more negative affect (Wagner, Heapy, Frantsve, Abbott, & Burg, 2006).

One construct that has been linked to quit attempts in precontemplating smokers is optimism (Dijkstra & De Vries, 2000), defined as expecting the best outcome (a positive expectancy). Dispositional optimism is associated with more effective coping, higher self-esteem, more internal locus of control, less hopelessness, less worry, more positive and less negative mood, and better social relationships (Nes & Segerstrom, 2006). Optimism as an explanatory style has been associated with lower risk of mortality (Brummett, Helms, Dahlstrom, & Siegler, 2006). However, smokers with medical illness have demonstrated "unrealistic optimism" in which the actual risk of continued smoking is minimized by the individual smoker, making them less likely to quit (Emery, Gilpin, Ake, Farkas, & Pierce, 2000).

While optimism has been linked to behavior change in precontemplating or persistent smokers, the nature of this association is not clear. Optimism can be dispositional (a personality characteristic) or situational, and existing studies on optimism in precontemplating smokers do not provide a clear distinction between the two types (Dijkstra & DeVries, 2000). This construct has not been consistently measured using a validated instrument in smoking cessation studies, such as the Life Orientation Test, Revised (LOT-R) (Scheier, Carver, & Bridges, 1994). When this standardized measure is used, dispositional optimism has been shown to act as a buffer to stress and is associated with increased involvement in social support (Scheier & Carver, 1985). Optimism has

also been shown to mediate coping patterns that involve approach or avoidance behaviors (Nes & Segerstrom, 2006), such as making a quit attempt versus not.

This dissertation explores potential relationships between self-efficacy, dispositional optimism, and planning to quit smoking in a sample of low SES rural dwelling, medically ill smokers. Planning to quit is the outcome measure, or goal state according to the model of self-regulation described above. Smokers who have a plan to quit demonstrate a desire to change their behavior from their current state (smoking). Self-efficacy and dispositional optimism, along with other smoking-related measures such as nicotine dependence, are explored related to their potential contribution to planning to quit smoking.

Overview of Chapter 2: Literature Review

The second chapter reviews the existing literature on hardcore smoking and examines evidence for the hardening hypothesis. The hardening hypothesis postulates that smokers who have found it easiest to quit have preferentially done so, and the remaining smokers are more resistant to existing smoking cessation treatment and policy approaches to tobacco control (Hughes, 2011). This hypothesis remains controversial due to a consistent lack of evidence to support its validity. However, it is critically important to understand the reasons for the persistence of hardcore smoking as these smokers comprise a significant proportion of the smoking population (Augustson & Marcus, 2004). Certain subgroups of the population, such as those with mental illness continue to smoke at persistently high levels (Hughes, 2011), reflecting disparities in the reach and effectiveness of current smoking cessation efforts. The review revealed inconsistencies in how hardcore smokers are characterized, defined, and operationalized

Overview of Chapter 3: Measurement Paper

The third chapter explores the reliability and validity of the Smoking Self-Efficacy Questionnaire (SEQ-12) (Etter, et al., 2000) in a sample of medically ill, rural dwelling smokers. Self-efficacy is a concept central to many theories and models of behavior change (Bandura, 2004; Fishbein & Yzer, 2003) and has been positively associated with smoking cessation in many studies (Gwaltney, Metrik, Kahler, & Shiffman, 2009). In this study, the SEQ-12 was modified and tested with a sample of

medically ill, low income, rural dwelling smokers (n = 70), along with a one item measure of confidence to quit. The SEQ-12 was modified to include four additional items based on the author's clinical experience working with medically ill smokers trying to quit. An author developed 1-item confidence to quit measure was tested to address potential low literacy levels in the sample. The SEQ-12 and the modified version were highly correlated with confidence to quit. The 1-item confidence to quit measure showed moderately strong reliability with this sample. Smoking status was obtained by self-report and those who had quit within the past year were defined as recent former smokers.

Overview of Chapter 4: Main Findings

The fourth chapter reports the main findings of a study examining factors associated with planning to quit in medically ill, rural dwelling smokers. This non-experimental, cross-sectional study was conducted at a free clinic in rural Kentucky between March 2010 and April 2011. The aims of the study were to explore the association between dispositional optimism, self-efficacy, and planning to quit in a vulnerable population of smokers (N = 62). For this study, a more conservative definition of quitting smoking was used (quit greater than 3 months) to distinguish those smokers who were at a lower risk of relapse. Having made quit attempts in the past 12 months and quitting self-efficacy were predictive of planning to quit. Dispositional optimism was not found to be predictive of planning to quit; however, the measure had weak reliability in this sample.

Overview of Chapter 5: Conclusion

The fifth and final chapter summarizes the findings and implications of this dissertation, including recommendations for smoking cessation policy, practice, and future research. There is considerable debate regarding approaches to reducing smoking prevalence in persistent smokers (Hughes, 2011; U.S. Department of Health and Human Services, 2003). Too little is known about persistent smoking in persons with medical illness (Gritz, et al., 2007). This study found that smokers with smoking-related medical illnesses continue to smoke at alarmingly high rates (50% of the clinic patients). Similar to the general population (Centers for Disease Control and Prevention, 2011), over 60% of this sample of relatively hardcore smokers were planning to quit. Chapter 5 focuses on

clinical, research and policy implications of targeting and tailoring smoking cessation strategies with medically ill, rural dwelling smokers.

CHAPTER TWO

Characteristics of Hardcore Smokers: Implications for Smoking Cessation Treatment

Literature Review

Introduction

Cigarette smoking causes nearly 1 of 5 deaths in the United States annually and tobacco control is a global priority (Centers for Disease Control and Prevention, 2010). The World Health Organization estimates that if current trends continue, one billion people will die of a tobacco related illness in this century (World Health Organization, 2008). In the United States, adult smoking prevalence has been on a slow decline in recent years (Chapman, 2007; Irvin, Hendricks, & Brandon, 2003; Mendez & Warner, 2004), yet certain subpopulations continue to smoke at disproportionately high rates (Centers for Disease Control and Prevention, 2010).

One subpopulation who continues to smoke is identified as persistent, or hardcore, smokers. They can be understood by applying the "hardening hypothesis" (U.S. Department of Health and Human Services, 2003). This hypothesis suggests that smokers who are less dependent on nicotine find it easier to quit, and these smokers account for most of the decline in prevalence rates. Hardcore smokers who exhibit higher levels of nicotine dependence remain and are more resistant to cessation efforts than those who are able to quit. There has been considerable controversy over the concept of hardening (Hughes, 2011; Hughes & Brandon, 2003; Warner & Burns, 2003) which has implications for smoking cessation treatment strategies and tobacco control policy. The aim of this integrative literature review is to examine studies of hardcore smokers which define and describe the characteristics of this population and identify implications for smoking cessation treatment.

Methodology

Pub Med MESH heading searches were performed to identify relevant research articles. Because there are inconsistent definitions and terminologies used to refer to hardcore smokers, a broad literature search was conducted using "smoking" and "behavior," "addictive" (N = 428), followed by an additional search using "tobacco use

disorder" and "chronic disease" (N = 43). There were an additional 27 relevant articles found using search terms "resistant", "hardened, hardcore, and hard-core smok*" published from January 1998 to January 2012. Abstracts of these studies (N = 498) were reviewed and screened for studies that explored variables associated with the hardcore smoking population. A total of 71 studies met inclusion criteria of being peer reviewed research and were reviewed for this paper. Studies were not limited to the United States, but were all published in English.

For the purpose of this review, articles referring to hardened, hardcore, resistant and persistent smoking were used, and the terminology used by the authors is summarized and discussed. While these terms are not synonymous, they are all used in the literature to describe smokers who are either unwilling or unable to quit.

Conceptual Definitions of the Hardcore Smoking Population

Although there is no standard definition of 'hardcore smoker,' the term has been referenced in the literature for many years by the tobacco industry, clinicians, and researchers. In making a case for targeting young smokers, a 1978 tobacco industry-sponsored marketing analysis on tobacco users' switching behaviors described "hardcore smokers" as older and brand loyal (http://legacy.library.ucsf.edu/tid/vtm76b00/pdf). In the clinical literature, the term has been referenced frequently but not universally defined. For example, a clinician's guide for treating "hard-core smokers" uses three distinct definitions, one based on smoking with a medical illness; one related to nicotine dependence; and one referring to the presence of co-morbid psychological factors (Seidelman & Covey, 1999). The term does not appear in the current Clinical Practice Guidelines (Fiore, Jaen, Baker, & et al, 2008).

The research literature on hardcore smoking has focused on characteristics associated with nicotine dependence (number of cigarettes smoked per day [CPD], and regular use), lack of motivation or readiness to quit, and quit history (no prior attempts or none in the past 12 months) (Augustson & Marcus, 2004; Emery, Gilpin, Ake, Farkas, & Pierce, 2000). Nearly all studies included subjects 25 years and older. Combinations of these factors are used to define hardcore smokers but not with consistency, and this accounts for differences in identifying the prevalence and characteristics of these smokers (Costa, 2010).

A concern related to the measurement of the construct of hardening is that the trends noted on the population level may not accurately represent the persistence of smoking in certain subgroups of the population, such as those with co-morbidities or those seeking treatment (Chaiton, Cohen, & Frank, 2008; Hughes, 2011). Characteristics of hardening at a population level have not been clearly identified (Warner & Burns, 2003). An evaluation of data from the California Tobacco Survey revealed that smokers did not report increased heaviness of smoking (more CPD and shorter time to first cigarette) over time and heavier smokers were more likely to respond to tobacco control efforts (O'Connor et al., 2006; U.S. Department of Health and Human Services, 2003). The decline in smoking prevalence in California has been associated with the comprehensive tobacco control policies in the state and may not translate to other regions (Centers for Disease Control and Prevention, 2010). In general, several subgroups of the population continue to smoke at disproportionately high rates, such as persons with mental illness, indicating groups of smokers remain who may not be as sensitive as others to population-based tobacco control interventions (Chaiton, et al., 2008).

Prevalence

Prevalence rates of hardcore smokers are directly affected by the criteria used to define them. This is problematic because there is no standard definition of hardcore smokers. A recent study explored the effect of varying criteria used in prior studies to define hardcore smokers (nicotine dependence, readiness and motivation to quit, and/or quit history) on the prevalence of hardcore smokers in Ontario, Canada. Using these varied definitions, prevalence rates ranged from 0.03% to 13.77% (Costa, 2010). Generally, the more criteria used to define hardcore smokers, the lower the prevalence rate. These findings reinforced conclusions in prior studies that a consistent definition and reliable measurement of these smokers is not currently available (Chapman, 2007; Mendez & Warner, 2004).

Prevalence studies in the United States have similar variation. In an analysis of the Tobacco Use Supplement of the Current Population Survey, the “hardened” population in the U.S was estimated to be 5 million, or 13.7% of current smokers (Augustson & Marcus, 2004). Hardened smokers were defined as smoking 15 or more cigarettes a day with no history of a quit attempt. Using a similar definition (smoking 15

or more CPD, no quit attempt in the past year, and no intention to quit), 5.2% of California smokers fell into this category (Emery, et al., 2000). A recent study exploring hardcore smokers in Missouri used the same definition and found a prevalence rate of 7.8% (Sorg, Xu, Doppalapudi, Shelton, & Harris, 2011).

International studies examining hardcore prevalence rates also produce dissimilar findings and use varied definitions. Defined as daily smokers for the past 5 years, no quit attempt in the past year, and no desire or intention to quit, 16% of smokers in England were identified as hardcore (Jarvis, Wardle, Waller, & Owen, 2003). Another study of British smokers in 1998-99 used a similar definition and found a combined prevalence of 16% of current smokers to be hardcore (MacIntosh & Coleman, 2006); however, two subgroups were included and a higher prevalence (17.3% vs. 7.9%) was reported from those in an economically disadvantaged region. A 2007 national study of Italian smokers defined hardcore smokers as daily smoking of 15 or more CPD for at least 5 years, no prior quit attempt, and no intention to quit in the next six months (Ferketich et al., 2009). The prevalence of hardcore smokers was 33.1% of all smokers, or 7.8% of the total population. A Norwegian study reported a decline in prevalence of hardcore smoking from 30% to 23% of current smokers over a 13-year period ending in 2009 (Lund, Lund, & Kvaavik, 2011). The researchers defined hardcore smokers as daily smoking with no quit attempt in the past year, no intent to quit in the next six months, and intent on still being a smoker in 5 years.

The term "Immotive" is another word used to define and measure hardcore smokers. Immotives are described as "healthy smokers," with the characteristics of high social acceptability of smoking, low perceived risk, and absence of physical symptoms who are not interested in quitting (Ladwig, Baumert, Lowel, Doring, & Wichmann, 2005). In this study of over 3,000 current smokers in Germany, 22% met the criteria of being immotive. Estimates of the percentage of Precontemplators who are Immotives vary widely, possibly because studies identifying these subtypes have been conducted with smokers from different cultures and geographic regions (Dijkstra & De Vries, 2000).

Quit intention as the primary criterion to define hardcore smokers is problematic when exploring prevalence. Because having no intention to quit, either ever or in the next 6 months, are criteria used in some definitions (Costa, 2010), these smokers fall into the

category of Precontemplation using Transtheoretical Model (TTM) criteria (J. O. Prochaska & Velicer, 1997). A population level analysis found that Precontemplators made up nearly 60% of the current smoking population in the 1990's (Wewers, Stillman, Hartman, & Shopland, 2003), and the distribution of stage of change among current smokers did not vary significantly over the decade. Another study in Rhode Island using TTM criteria found that 42% of smokers were Precontemplators and smoked an average of 20 CPD. These smokers were described as functioning as "black holes" (p. 2723), and provided little information about their potential for behavioral change (Sun, Prochaska, Velicer, & Laforge, 2007). If intention to quit alone is used as a criteria for defining hardcore smoking, 30% of smokers would be classified as hardcore based on the National Health Interview Survey data collected from 2001 to 2010 which found that 70% of smokers want to quit (Centers for Disease Control and Prevention, 2011).

In summary, prevalence rates of hardcore smoking depend on the definition used but generally range from 5.2 to 60% in the U.S and from 7.9 to 33.1% internationally. This wide variation highlights the impact of using varied definitions on prevalence estimates of hardcore smokers. Generally, the more criteria used in a definition, the lower the estimated prevalence, which is illustrated in the use of the general term Precontemplators having a high prevalence (60%) and the more specific definintion of Immotives having a lower prevalence (22%).

Characteristics of Hardcore Smokers

Measures of nicotine dependence, intention to quit, self-efficacy, motivation, and sociodemographic factors have been used in most of definitions of hardcore smoking and they are reviewed below. A summary of select studies exploring smoking related variables in hardcore smokers is found in Table 1. Additionally, demographic characteristics of hardcore smokers and the relationship between medical illness and psychological co-morbidities are examined.

Nicotine dependence

High levels of nicotine dependence is frequently associated with persistent and hardcore smoking (Costa, 2010; Hyland et al., 2004; Irvin, et al., 2003; Joseph et al., 2005; Schnoll & Lerman, 2006; Shiffman, Brockwell, Pillitteri, & Gitchell, 2008). Nicotine dependence is often measured by the Fagerstrom Test of Nicotine Dependence

(FTND) (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) to define persistent and hardcore smokers. Fagerstrom & Furberg (2008) reported that lower nicotine dependence scores were found in countries with higher prevalence of daily smoking (Germany, Norway), and higher scores were reported in countries (United States, Sweden) with lower prevalence. The authors postulated that the hardening process may be more prevalent in the United States and Sweden based on higher dependence scores. This study excluded persons with psychiatric and other co-morbidities and has been criticized for not adequately representing U.S. smokers (Etter, 2008). In a recent analysis of Canadian smokers, 9% of smokers were classified as hardcore when nicotine dependence was used as the sole indicator (Costa, 2010).

Smoking 15 or more cigarettes a day is also used as a nicotine dependence criterion to define hardcore smokers (Augustson & Marcus, 2004; Emery, et al., 2000). Nordstrom et al. (2000) used CPD to define heavy smokers (i.e., > 25 CPD) and found they were more likely to smoke long term than lighter smokers (i.e. ≤ 15 CPD). A recent study found that characteristics of nicotine dependence (smoking 15 or more CPD, daily smoking and high Heaviness of Smoking score, a measure which combines CPD and time to first cigarette) were most predictive of continued smoking, and recommended the use of this combined measure in testing the hardening hypothesis (Ip et al., 2012). It is important to note that this study excluded portions of the population who are likely to have higher rates of hardcore smoking such as prisoners and those in treatment facilities.

The use of CPD as a valid measure of nicotine dependence has been challenged (Hughes, 2011; Joseph, Bliss, Zhao, & Lando, 2005) and there are significant individual differences in nicotine dependence among smokers which is not consistently associated with CPD (Donny, Griffin, Shiffman, & Sayette, 2008; Ray, Schnoll, & Lerman, 2009). Genetic variation in both nicotine metabolism and the effects of nicotine on the brain has been explored as contributors to these differences in heaviness of smoking (Lerman, Schnoll, & Munafo, 2007; Ware, van den Bree, & Munafo, 2011).

In summary, nicotine dependence as an indicator of hardcore smoking is typically measured by CPD and the FTND though some have also used the Heaviness of Smoking Index. These measures are distinctly different and include varying components of addiction, such as smoking urges in the FTND. Additionally, these criteria may be

descriptive but not sufficient to explain the metabolic and genetic variations associated with nicotine dependency which may contribute to hardcore smoking on an individual level.

Readiness/Intent to Quit

Persistent or hardcore smokers are also characterized as having certain behavioral characteristics (i.e., not ready to quit or no intention to quit). Stage of change (J. O. Prochaska, 2008), self-efficacy (Bandura, 2004), and motivation are often used to describe characteristics of hardcore smokers. Conceptually, hardcore smokers fall into the Precontemplation stage of change (Wewers, et al., 2003).

The Transtheoretical Model (TTM) has been widely used to guide studies of smoking cessation; yet there are concerns about using the characterization of smokers in the Precontemplation stage as a way to define hardcore smokers. Schumann et al. (2005) analyzed the components of the TTM and developed a structural model based on behavior, cognition, pros and cons, and self-efficacy which crossed the boundary between Precontemplation and Contemplation. Analysis of these constructs did not distinguish between stages of change, implying that Precontemplation and Contemplation may not be discrete stages. Yet, Precontemplation is often used to characterize hardcore smokers (Costa, 2010).

Precontemplators are typically defined as those who deny that smoking is a problem and have no current intention to quit (DiClemente et al., 1991). Ladwig et al. (2005) used the term "immotive" to refer to "hard-core smokers who are completely unwilling to change smoking habits" (p. 136). The term "immotive" has been used to identify a characteristic of five behavioral clusters of smokers in Precontemplation: Motivated Optimists and Pessimists, Unmotivated Optimists and Pessimists, and Disengaged (Dijkstra & De Vries, 2000). The subgroups differ significantly in their potential motivation to quit, with Pessimists and Disengaged subtypes characterized as more immotive, or hardcore. Anatchkova et al. (2006) identified three additional subgroups characterized as "progressing" and two forms of "disengaged" smokers, based on pros or cons of smoking and temptations to smoke. The authors felt the additional subgroups may reflect cultural differences in U.S. versus Dutch smokers.

In summary, using the Precontemplation stage of change to categorize hardcore smokers limits our understanding of the hardening concept. Variations found in of levels of motivation call into question the construct validity of using the TTM criteria of Precontemplators as a defining characteristic of hardcore smokers. These studies of subgroups also suggest personality factors, such as optimism/pessimism may be important to consider.

Quitting Self-Efficacy

Low self-efficacy has also been associated with hardcore smoking. Self-efficacy is defined as a person's belief about their capability to control or change their behavior (Bandura, 1991). A qualitative study of smokers over 65 years described a sense of fatalism related not only to the harmful effects of smoking, but also to low self-efficacy for quitting which was compounded by health care providers' belief that older smokers were less likely to be successful quitters (Kerr, Watson, Tolson, Lough, & Brown, 2006). Another qualitative study of older smokers with lung disease reported fatalism as a factor in persistent smoking. This was linked to high levels of nicotine addiction and low confidence in quitting, particularly for those with prior failed quit attempts (Schofield, Kerr, & Tolson, 2007). Low self-efficacy after a quit attempt led to lower rates of smoking abstinence in persons with depressed mood (Cinciripini et al., 2003).

In addition to fatalism and failed quit attempts, other factors have been linked to quitting self-efficacy. Self-efficacy has been associated with initiation of quit attempts, but this was not predictive of cessation maintenance (Baldwin et al., 2006). Concerns about post-cessation weight gain are also associated with low quitting self-efficacy among persistent smokers (Sepinwall & Borrelli, 2004). In summary, self-efficacy may be an important characteristic of hardcore smokers, especially among older smokers and those with a history of relapse. Self-efficacy beliefs on the part of both the smoker and health care providers appear to have an effect on persistent smoking but the specific relationship between these variables and hardcore smoking are not yet clearly understood.

Motivation to Quit

Hardcore smokers are often characterized as unmotivated to quit (Anatchkova, et al., 2006; Dijkstra & De Vries, 2000; Ladwig, et al., 2005) but studies fail to provide a clear connection. Motivation in cessation literature is defined as willingness to quit and

motivational interviewing is a recommended strategy to assist those who are not yet willing to quit (Fiore, et al., 2008). The motivational effect of risk in persons with smoking related illness is not clear. Young smokers (age 18-25) without disease developed increased motivation to quit when they perceived a genetic risk of cardiovascular disease (Wright, French, Weinman, & Marteau, 2006). Currently smoking head, neck, and lung cancer patients' motivation to quit was initially influenced by perceived risk of harm, but the perception of risk decreased over time (Hay et al., 2007). This effect has also been demonstrated in other studies of cancer patients (Weinstein, Marcus, & Moser, 2005). A risk minimization effect may be related to persistent or recurrent smoking in hardcore smokers, but possibly only in those with cancer or cardiovascular illness. Conversely, interventions aimed at promoting quit behavior in persons with lung disease were found to be most effective in the group that initially had the lowest motivation to quit (Hilberink, Jacobs, Bottema, de Vries, & Grol, 2005).

In summary, findings regarding the relationship between motivation and hardcore smoking present a mixed picture, particularly when motivation to quit is linked to risk. Using a self regulatory model of motivation, having a promotion focus (finding pleasure in positive outcomes), but not a prevention focus (avoidance of negative consequences) has been linked to willingness to quit (Fuglestad, Rothman, & Jeffery, 2008). This framework has some support in the studies which found a risk minimization effect in persistent smokers and may partly explain why smokers are not motivated to change their behavior when faced with negative health consequences (Dillard, McCaul, & Klein, 2006).

Age

The lowest rates of decline in prevalence of current smoking and highest proportion of hardcore smokers are in those over the age of 65 (Jarvis, et al., 2003; Lund, et al., 2011). Wewers et al. (2003) reported the largest group of Precontemplators in the older age group. Messner et al. (2008) found that younger smokers were more likely to quit successfully than older adults, a finding supported by Hyland et al. (2006). Several reasons cited for higher smoking rates in the elderly are fatalism, social and historical influences, unrealistic optimism, fear of weight gain, and perceived benefits of continued

smoking (Dillard, et al., 2006; Honda, 2005; Kerr, et al., 2006; Messer, et al., 2008; Sepinwall & Borrelli, 2004).

An age discrepancy has been noted where younger men have been found to be more likely than older men to be long term smokers and less likely to quit when diagnosed with cancer (Nordstrom, et al., 2000; Walker, Larsen, Zona, Govindan, & Fisher, 2004). Other population based studies report the highest prevalence of hardcore smokers in the middle aged group (mid-40's to 64) than in older or younger groups (Emery, et al., 2000; Ferketich, et al., 2009; Sorg, et al., 2011). Another study found no age differences in hardcore prevalence (MacIntosh & Coleman, 2006).

A relatively consistent finding is that age at initiation of smoking is negatively correlated with persistent smoking (Augustson & Marcus, 2004; DiFranza et al., 2007; Emery, et al., 2000; Gritz, Schacherer, Koehly, Nielsen, & Abemayor, 1999). Onset of smoking at a younger age has clearly been shown to be associated with an increased likelihood of continued smoking. In summary, hardcore smoking can occur at any age but is most likely among middle to older age groups and those who started smoking earlier in life.

Gender

Studies differ with respect to the association between gender and hardcore smoking. Women who are heavy smokers are less likely than their male counterparts to quit smoking (Freund, D'Agostino, Belanger, Kannel, & Stokes, 1992; Hyland, et al., 2004). These results may be confounded by the fact that men may be more likely to switch to smoking pipes or cigars than women. Hyland et al. (2004) found when quitting tobacco use was used as the endpoint versus only cigarette use, gender differences disappeared.

Other large population-based studies report that men are more likely than women to be hardcore smokers (Augustson & Marcus, 2004; Emery, et al., 2000). The prevalence of smoking globally in the general population is significantly higher in men, particularly in moderate to low income countries (Ferketich, et al., 2009; World Health Organization, 2008). However, Sun et al. (2007) reported a higher percentage of female persistent smokers in New England (55.3 vs. 44.7 % male), but the difference was not significant.

A gender analysis of hardcore smokers showed significant differences in workplace restriction exposure, nicotine dependence, and access to healthcare (Augustson, Barzani, Rutten, & Marcus, 2008). Female hardcore smokers were less likely than their male counterparts to have exposure to smoking restrictions at work or home. Also, women defined as hardcore smokers were less likely to receive advice from a healthcare provider to quit compared to their male counterparts. Gender differences were also reported in age at onset of smoking, with hardcore female smokers consuming fewer CPD and initiating smoking at an older age than their male counterparts.

In summary, the literature is mixed on whether males or females are more likely to be hardcore smokers. The differences may have more to do with a greater incidence of the use of tobacco products other than cigarettes by males. Environmental factors may also play a role, such as gender differences in exposure to workplace or home smoking restrictions and gender disparities in receiving advice or assistance to quit.

Ethnicity

The few studies noting an association between hardcore smoking and ethnicity reported that being non-Hispanic White is correlated with persistent smoking (Emery, et al., 2000; Sorg, et al., 2011; Wewers, et al., 2003). However, Shiffman et al. (2008) found an association between being Caucasian and increased treatment utilization for quit attempts. This finding may be confounded by social and cultural limitations in access to treatment. Some studies report that race and ethnicity are not associated with hardcore smoking because minority groups are underrepresented in the literature (Nordstrom, et al., 2000; Sun, et al., 2007; Warner & Burns, 2003). Further study of the hardcore smoking phenomenon in minority groups is clearly needed.

Socioeconomic Status (SES)

Several large studies report a correlation between low SES and persistent smoking (Augustson & Marcus, 2004; Emery, et al., 2000; Hyland, et al., 2004; Warner & Burns, 2003; Wewers, et al., 2003). For most of these studies, educational level is negatively correlated with persistent smoking. The Normative Aging Study (Nordstrom, et al., 2000) did not find a correlation between persistent smoking and educational level, but the study was based on a homogenous cohort of healthy men. Income level was not reported. In

summary, low income and low education level are characteristics associated with hardcore smoking but the nature of this association remains unclear.

Medical Co-morbidity

Medically ill smokers are a unique group of hardcore smokers who report relatively high levels of persistent smoking (Gregor & Borrelli, 2011). Emery et al. (2000) found that hardcore smokers were more inclined to minimize the negative health consequences of smoking. A 44% higher incidence of mortality has been found among immotive smokers (defined as smokers with no physical symptoms and low perceived risk of illness who are not interested in quitting) compared to those actively contemplating cessation (Ladwig, et al., 2005). A study of lung cancer patients in Brazil, found that subjects minimized their risk of lung cancer from smoking (Dias & Turato, 2006). The authors attributed this to an attempt to suppress overwhelming feelings of guilt that their behavior was the cause of their illness. In a Dutch study of smokers with COPD, nearly half were not planning to quit, despite having worsening respiratory symptoms (Hilberink, Jacobs, Schlosser, Grol, & de Vries, 2006). Mild early symptoms and under-diagnosis of COPD may promote persistent and heavy smoking globally (Slama, 2008).

Studies of head, neck, and lung cancer patients who continue to smoke have attempted to identify characteristics that lead to persistent smoking, but they are limited in number (Browning & Wewers, 2003). Schnoll et al. (2006; 2002) reported that the patient's medical condition and demographic characteristics were not significantly associated with quit attempts. Readiness to quit among these patients was most affected by self-efficacy, level of addiction, pros and cons of quitting, fatalism, and emotional distress.

In summary, research on cessation with chronically ill smokers has been sparse (Gritz, Vidrine, & Fingeret, 2007), with many gaps in the literature and methodological weaknesses. There is clearly a need for further research to guide treatment recommendations for smokers who have medical illness and persist in using tobacco, particularly related to the effects of perceived risk.

Psychological Co-morbidity

Persons with mental illnesses are also categorized as persistent smokers and comprise a significant proportion of current smokers in the United States (Hagman, Delnevo, Hrywna, & Williams, 2008). Because these smokers historically have limited access to cessation treatment, it is difficult to determine the proportion of persons with mental illness that are also hardcore smokers (J. J. Prochaska, 2011). Adverse childhood experiences such as verbal, sexual, and physical abuse, parental abuse, mental illness, substance abuse, or imprisonment are highly correlated with persistent and heavy smoking (Anda et al., 1999). Persons with a disability are more likely to be smokers than those without a disability, and 43% of disabled smokers experience emotional difficulties (Altman & Bernstein, 2008).

Several psychosocial factors have been associated with hardcore smoking and long-term tobacco use and include anxiety, depression, and mental illness. However, the nature and direction of these relationships remains unclear (Ziedonis et al., 2008). In a study exploring the predictive effect of mental illness on smoking behaviors, no association was found with smoking persistence (Breslau, Novak, & Kessler, 2004). Epidemiologic evidence of the associations among anxiety, depression and smoking maintenance is mediated by level of nicotine dependence (Morrell & Cohen, 2006) and persons with serious psychological distress (SPD) have been found to be significantly more nicotine dependent than those without SPD (Hagman, et al., 2008).

Depressive symptoms are correlated with persistent smoking in persons affected adversely by smoking, such as persons with acute coronary syndrome (Kronish et al., 2006) and diabetes (Canga et al., 2000; Katon et al., 2004). In summary, associations have been found between persistent smoking and psychological co-morbidities; however, the direction and nature of these relationships remain unclear.

Sociological factors

Hardcore smokers may be characterized as isolated from both individual support and public health programs that support cessation (Augustson & Marcus, 2004). This lack of effective cessation support may contribute to lower intention to quit and fewer quit attempts. Costa et al (2010) suggested social isolation may contribute to persistent smoking based on findings with hardcore smokers in Canada. A study exploring attitudes

and beliefs of heavy smokers, defined as those smoking more than 25 CPD found participants, while feeling they should quit, experienced significant pressure to continue smoking from both internal and external psychosocial sources (Thompson, Thompson, Thompson, Fredickson, & Bishop, 2003). Demonstrating little movement toward quitting, stable smokers showed some responsiveness to environmental factors where they received positive support from others for not smoking over time (Sun, et al., 2007).

Social marginalization is a concern related to persistent smoking. Marginalization occurs when the social norm regarding a behavior (e.g. not smoking) leads to centrality in a social network of those accepting that norm, driving those with anti-normative behavior (e.g. smoking) to the periphery of the social network (Schroeder, 2008). An analysis of the Framingham participant offspring cohort examined social networking effects on smoking behaviors and found increased marginalization among persistent smokers, and recommended targeting these smaller groups of hardcore smokers for cessation in addition to continuing broad-based, policy oriented measures aimed at reducing smoking. (Christakis & Fowler, 2008).

A review of the impact of social networks on persistent smoking explored web-based postings of smokers (Katainen, 2006). Justification for smoking was linked to autonomy and individual competence. Additionally, comments indicating a disregard of health risks of smoking were also identified. In summary, the exploration of the effects of social networks present interesting and emerging considerations related to developing a better understanding of hardcore smoking. Social norms and social isolation can be powerful forces in determining how persistent smokers receive help for quitting or reinforcement for continued smoking.

Current Research Trends and Gaps

The definitions and characteristics of the hardcore smoking population are not consistently or clearly described in the literature. Even use of the terms “hardened”, “hardcore”, “persistent”, and “immotive” are used somewhat interchangeably to describe the same concept. Due to different definitions, wide variations in prevalence estimates exist. Conversations regarding these smokers as a significant at risk population continue (Chaiton, et al., 2008; Etter, 2008; Hughes, 2011; Lund, et al., 2011; Mathews, Hall, & Gartner, 2010; Sorg, et al., 2011). Consistent with the discussion in the 2003 Monograph

(U.S. Department of Health and Human Services, 2003), no new or compelling epidemiological evidence has emerged to support the hardening hypothesis that current smokers are becoming more nicotine dependent and resistant to quitting smoking in recent years.

Many studies continue to describe subgroups of hardcore smokers, yet they fail to provide a clear or consistent picture of the hardcore smoking population. While findings are somewhat discrepant related to age and gender, there is consistent evidence that early age of smoking initiation is associated with hardcore smoking. These findings support the critical importance of youth prevention initiatives. The success of youth prevention measures may have contributed to lower rates of hardcore smoking in regions with strong tobacco control policies, such as California (U.S. Department of Health and Human Services, 2003) where prevalence rates of hardcore smokers at 5.2% remain well below the national average (Centers for Disease Control and Prevention, 2010).

The literature provides some support for the characterization of hardcore smokers as highly nicotine dependent with resultant lower rates of cessation success. It is unclear which inherent characteristics of hardcore smokers and/or current smoking cessation treatment approaches correlate most consistently with low rates of seeking cessation treatment and smoking abstinence. Hughes (2011) suggests definitions which include multiple criteria, such as intention, motivation, and nicotine dependency make it too difficult to ascertain, much less compare from one study to another, which characterisitics are truly associated with hardcore smoking. He recommends a definition based an inability to maintain abstinence from smoking due to high nicotine dependence.

Hardcore smoking is also associated with medical and psychological illness as well as social marginalization, but the literature is unclear as to the nature of these associations. The presence and degree of physical symptoms appears to reduce smoking persistence; however studies have also identified a risk minimization effect in asymptomatic smokers with medical illness which may contribute to hardcore smoking. Persistent smokers, particularly those who are chronically ill, continue to place a heavy burden on the health care system (Centers for Disease Control and Prevention, 2009). There is concern that increased marginalization of persistent smokers, particularly those with mental illness, may contribute to high prevalence of smoking not because the

smokers are more becoming more hardcore, but because their access to treatment is limited (J. J. Prochaska, 2011; Schroeder, 2008). Tailored and intensive interventions have been shown to be effective in subgroups of persistent smokers but have not been widely adopted (Okoli, 2011; Sharp & Tishelman, 2005; Willemse, Lesman-Leegte, Timens, Postma, & ten Hacken, 2005). There is clearly a need for further research on persistent smoking among those with medical and psychological illness.

Much of the literature describes hardcore smokers as not contemplating cessation. Qualitative studies have been useful in exploring individual differences related to persistent smoking behaviors. Many studies continue to be based on the traditional TTM despite concerns regarding the appropriateness of stage-based approaches to treatment for hardcore smokers (West, 2005). Using differential characteristics of subgroups of Precontemplators may provide a better understanding of specific factors influencing smoking behaviors in hardcore smokers, such as personality and motivation.

It may not be the smokers themselves but lack of available treatments that may contribute to hardcore smoking prevalence in the population (Irvin, et al., 2003; Sheffer et al., 2012). Describing hardcore smokers as unwilling to quit implies they are resistant to behavioral change, which places the onus of responsibility for quitting solely on the individual. A description of hardcore smoking which considers factors such as access to treatment, could explain why certain subgroups continue to smoke as a function of the failure of both the reach and efficacy of cessation resources. This distinction has important implications for smoking cessation policy initiatives.

Further, there is inconsistent and suboptimal use and implementation of the current Clinical Practice Guidelines (Fiore & Baker, 2011). Models which consider internal (i.e., biological, behavioral, psychological, genetic) and external (i.e., socio-cultural) factors may be a more appropriate in understanding factors most closely aligned with the utilization of smoking cessation treatments by hardcore smokers.

Conclusion

The hardening hypothesis cannot be supported, or dismissed, as long as there is inconsistency in how hardcore smokers are defined. Hardcore terminology implies some smokers (and subgroups of smokers) are neither ready nor willing to quit. Based on this

review, numerous studies have identified subgroups of persistent or hardcore smokers but a complete and consistent description of these smokers remains unclear.

Most studies define hardcore smokers as highly nicotine dependent. Using standardized measurement tools such as the Heaviness of Smoking Index (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989) can improve valid and reliable assessment of this characteristic of hardcore smokers. This measure includes cigarettes per day (CPD) and time to first cigarette. While most current studies of hardcore smokers include CPD, it is the time to first cigarette which has been found to best measure nicotine dependence (Baker et al., 2007), and both have been found to be strong predictors of quitting behaviors (Borland, Yong, O'Connor, Hyland, & Thompson, 2010).

Intention to quit is considerably more problematic when used to describe hardcore smokers. Intention to quit can be influenced by many factors, such as self-efficacy, motivation, social environment, co-morbidities, socioeconomic status, and access to treatment resources. An instrument such as the Quit Ladder was found to be a valid and reliable measure of readiness to consider quitting in Precontemplators (Biener & Abrams, 1991). However, the underlying premise of using a stage of change paradigm has been challenged (Herzog, 2008), as nearly half of quit attempts are spontaneous (West & Sohal, 2006). Further, the Clinical Practice Guidelines (Fiore, et al., 2008) and studies of medication use (Shiffman & Ferguson, 2008) indicate that smoking cessation interventions can be effective regardless of smokers' readiness to quit.

Self-efficacy and motivation to quit are important constructs which have been show to impact smoking behaviors (Gwaltney, Metrik, Kahler, & Shiffman, 2009; Lai DTC, Cahill K, Qin Y, & Tang JL., 2010). While low self-efficacy and low motivation to quit may seem at face value to be consistent with hardcore smoking, the studies reviewed present a more complex picture. Self-efficacy and motivation are not fixed over time and are influenced by many factors. More work needs to be done in this area to determine how these factors influence or are influenced by hardcore smoking.

It is important to note that studies of the demographic characteristics of hardcore smokers also fail to present a clear picture. Smoking prevalence for women varies by culture and has lagged behind men in the past, so inconsistent findings of gender differences could have been influenced by when these studies were done. Hardcore

smokers are predominantly of lower socioeconomic status and education level, but does this reflect a characteristic of the smoker or a failure on the part of tobacco control efforts to reach disparate populations? This is a key question to answer if hardcore smokers are contributing to the slower rates of decline in smoking prevalence. Recent analysis of Massachusetts Medicaid indicates that when barriers to cessation treatment are reduced for low SES smokers, prevalence rates declined (Land et al., 2010).

The long-term impact of comprehensive interventions to change the behaviors of hardcore smokers remains to be seen and further research is needed on the underlying processes related to smoking persistence and how best to intervene with hardcore smokers (Croyle & Backinger, 2008). Strategies must be developed and tested with smokers who are unable to quit or are seemingly disinterested in quitting. Creating environments that discourage the use and social acceptability of smoking and encourage smoking cessation treatment are needed in order to intervene with hardcore smokers. Providing effective treatments for all smokers is an integral part of smoking cessation efforts, and necessary to reduce tobacco's horrible toll on global health and well-being.

Table 2.1. Select Study Definitions of Hardcore Smoker Characteristics

Study	Hardcore Related Smoking Definition	Key Findings
Nicotine Dependence		
Nordstrom, et al (2000)	25 or more cigarettes per day (CPD)	Heavier smokers more likely to smoke long term
Donny, et al (2008)	10 or more CPD for 10 or more years	38% of heavy smokers were not ND as measured by DSM-IV
Fagerstrom & Furberg (2008)	Fagertsrom Test of Nicotine Dependence (FTND) greater than 4	Countries with lower smoking prevalence had higher FTND scores
Ip, et al (2012)	15 or more CPD,high nicotine dependence (ND), daily smoking greater than 5 years, no quit intention and no life-time quit attempt	Motivation and intent to quit were associated with no quit attempts; ND with persistent smoking
Quit Intent		
Dijkstra &DeVries (2000)	No plan to quit in next 6 months	HC smoking associated with pessimism and disengagement from quitting process
Anatchkova, et al (2006)	No plan to quit in next 6 months	Immotives most stable cluster with high Pros, low Cons, and high temptation to smoke

Table 2.1 (continued)

Study	Hardcore Related Smoking Definition	Key Findings
Quitting Self-Efficacy		
Schofield, et al (2007)	Current smoking after diagnosis of COPD	Fatalism, high ND, low confidence to quit, history of failed quit attempts identified by persistent smokers
Motivation to Quit		
Dijkstra & DeVries (2000)	No plan to quit in next 6 months	High pros of quitting defined motivated smokers and was associated with more quit attempts
MacIntosh & Coleman (2006)	Daily or most day smoking; no desire to quit; no intent to quit in the next 4 weeks; no quit attempt past 12 months	16% of predominantly male, highly nicotine dependent smokers presenting to health care providers were not motivated to quit
Age of Smoking Initiation		
Jarvis, et al (2003)	Daily smoking for more than 5 years; no desire or intent to quit; no quit attempt past 12 months	Initiating smoking before age 15 was associated with a 46 % greater likelihood of being a hard core smoker that starting at age 18 or older
Augustson & Marcus (2004)	At least 26 years old, daily smokers, having at least a 5-year smoking history, smoking at least 15 CPD, no reported intent to quit, and never made a quit attempt	Mean age of initiation of smoking for hardcore smokers was 16.9; current smokers 18.3 years

CHAPTER THREE

The Reliability and Validity of a Self-Efficacy Instrument with Medically Ill Smokers

Introduction

The purpose of the study was to investigate the psychometric properties of a modified version of Etter's Smoking Self-Efficacy Questionnaire (SEQ-12) (Etter, Bergman, Humair, & Perneger, 2000) and a 1-item measure of confidence to quit in a sample of medically ill smokers who attend a free clinic in rural Kentucky. The self-efficacy measure was part of a larger survey used to explore potential factors associated with planning to quit in this population. While self-efficacy measures are commonly used in smoking cessation research and treatment, little is known about the reliability and validity of these measures in samples of medically ill, rural dwelling smokers.

Background

Tobacco use remains the leading cause of preventable death in the United States, and it has clear links to many major disease states (U.S. Department of Health and Human Services, 2010). While overall smoking prevalence has dropped over the past 25 years, there has been a slowing effect in recent years. Some researchers speculate there is a residual core of difficult-to-treat smokers who have not responded to traditional cessation interventions (Chapman, 2007; Hughes & Brandon, 2003). Medically ill individuals demonstrate unique characteristics and continue to smoke at rates higher than the general population (Gregor & Borrelli, 2011). Persistent smoking in persons with medical illness has been associated with a risk minimizing effect, where perceived risk of illness remains low despite having an illness clearly linked to smoking (Dias & Turato, 2006; Hilberink, Jacobs, Schlosser, Grol, & de Vries, 2006).

In a prospective study exploring the impact of sentinel health events on smoking patterns, 45% of patients seen in an emergency department (ED) did not recognize that smoking contributed to their condition (Boudreaux, Baumann, Camargo, O'Hea & Ziedonis, 2007). Half of these patients made a quit attempt after their ED visit. This study used a 9-item Self-Efficacy Questionnaire exploring confidence to quit in certain situations (5-point rating) and found those making quit attempts had higher self-efficacy scores.

Self-efficacy, optimism, and outcome expectancies are associated with behavior change in persons in the early stages of contemplation and precontemplation (Dijkstra & De Vries, 2000). Self-efficacy has been specifically linked to prevention of relapse to smoking in women with cardiovascular disease (Li & Froelicher, 2008). However, an acute health event can have either a positive effect on behavior change or a negative effect on engagement in smoking cessation (Boudreaux et al, 2007, Wagner et al, 2006).

While cessation treatments have been extensively studied in healthy smokers, less is known about the cessation needs of smokers with chronic medical illness (Gritz, Vidrine, & Fingeret, 2007). What is clear is that medically ill smokers can disproportionately benefit from cessation (Critchley & Capewell, 2003). Tailored and targeted interventions aimed at specific physical and psychological needs are most effective (Gritz, et al., 2007). Developing effective targeting and tailoring requires a good understanding of the characteristics of readiness for behavioral change in medically ill smokers.

Smokers with chronic illness report more pros of smoking and have greater difficulty remaining abstinent than their healthy counterparts (Wagner, Heapy, Frantsve, Abbott, & Burg, 2006). Often smokers who need to quit the most continue to smoke. Psychological processes are a known component of persistent smoking, and heavy smokers often procrastinate and perceive greater difficulty quitting (Thompson, Thompson, Thompson, Fredickson, & Bishop, 2003). In addition, relapse rates are nearly 50% in smokers after an acute cardiovascular event (Holtrop, Stommel, Corser, & Holmes-Rovner, 2009). In one study, 37% of women who smoked prior to heart transplant relapsed (Evangelista, Ter-Galstanyan, Moser, & Dracup, 2009).

Self-efficacy is a central concept in research on the motivational aspects of quitting smoking and maintaining abstinence (Boardman, Catley, Mayo, & Ahluwalia, 2005; DiClemente, 1981). A recent meta-analysis of studies on self-efficacy and smoking cessation supported this association (Gwaltney, Metrik, Kahler, & Shiffman, 2009). However, the analysis raised questions about the measurement of the self-efficacy construct. The size of the effect was inversely related to the number of items on the self-efficacy instruments used, with single-item questions having the strongest ability to predict long-term cessation. The timing of administration of self-efficacy measures was

also an important consideration. Self-efficacy measures administered after initiation of the quit process had stronger predictive ability than those administered prior to beginning the quit process.

One instrument designed to measure quitting self-efficacy, the SEQ-12, was developed by researchers in Europe (Etter, et al., 2000). It has good reliability and validity when used among a variety of populations (Christie & Etter, 2005; Leung, Chan, Lau, Wong, & Lam, 2008). The instrument measures two factors; internal and external stimuli that affect a smoker's ability to refrain from smoking. Internal stimuli include mood descriptors (e.g., nervous, depressed, angry) and concentration. Items indicating the effect of external stimuli include situations where a smoker might be tempted to smoke (e.g., with other smokers, drinking alcohol or coffee, after a meal).

Both smoking prevalence and rates of tobacco-related illnesses are disproportionately high in Kentucky (Centers for Disease Control and Prevention, 2005, 2007, 2008). Additional research is needed to determine more effective strategies to engage smokers in smoking cessation, particularly in at-risk populations such as those with medical illnesses. This study aimed to validate a questionnaire for measuring self-efficacy in rural dwelling, medically ill smokers, using a modification of Etter's SEQ-12 (Darville, not published).

The specific aims of the study were to:

1. Examine the dimensionality of the SEQ-12 and a modification which added two internal and two external items.
2. Assess the reliability of the modified SEQ-12 in current and former (quit within the past 12 months) smokers.
3. Evaluate concurrent and construct validity of the modified scale.
4. Assess for correlation between the 1-item self-assessment of self-efficacy and the multi-item SEQ-12.

Hypothesis: The modified SEQ-12 will be positively correlated with the original SEQ-12 and a 1-item self-assessment of self-efficacy in a sample of rural medically ill smokers.

Methods

Design and Sample

A cross-sectional, non-experimental research design using survey methodology was used. The convenience sample (N = 70) was recruited from patients and family members of a free clinic in Kentucky serving a 6-county rural region. The clinic provides care to approximately 200 people with chronic medical conditions who do not have a regular source of health care or insurance and are at or below 150% of the federal poverty level. Approximately 45% of the clients are current or recent former (quit within the past year) smokers.

Inclusion criteria were current or recent former (previous 12 months) smoking, diagnosis of at least one chronic illness, and over 18 years of age. Participants spoke English and were cognitively intact as evidenced by orientation and responses during clinical examination. They were also able to complete a brief paper and pencil survey, either alone or with assistance, based on self-reported functional literacy skills. Due to missing items in the modified SEQ-12, the analyses were conducted on 51 of the 70 survey responses.

Measures

Self-efficacy

The SEQ-12 is a 12-item instrument designed to measure self-efficacy behaviors, or the confidence a smoker has when encountering various situations where they may be tempted to smoke. It has undergone reliability and validity testing in populations with and without medical illness (Christie & Etter, 2005; Leung, et al., 2008). Respondents rank each item on a 5-point Likert scale based on how confident they are that they would not smoke in a given situation. The first six items query internal factors such as emotional situations and the second six items measure external factors such as social situations. The original SEQ-12 asks the respondent to, "Please indicate how sure you are that you could refrain from smoking" in certain situations. Response options ranged from not at all sure (1) to very sure (5). The wording of the stem was altered for this study to take into consideration the literacy level of the sample: "Listed below are some situations in which certain people may want to smoke. Please circle the number to

indicate how sure you are that you would NOT SMOKE in each situation." The response options remained the same.

The modified scale for this study adds four new items based on the investigator's previous clinical experience with cessation in medically ill smokers. The modifications were reviewed with the author of the SEQ-12 and the instrument was used with his permission (personal communication, JF Etter, April 7, 2009). The new internal items were "When I'm bored" and "When I'm in pain." The new external items were: "When I'm alone" and "When something bad happens." To assess content validity, the revised version was reviewed by a panel of experts in tobacco use and cessation.

In addition, a single, author-developed item was used to measure self-efficacy for smoking cessation: "How confident are you that you can quit smoking and stay quit?" This question was based on Gwaltney et al.'s (2009) findings that studies using a greater number of self-efficacy questions report poorer predictive ability of self-efficacy and cessation outcomes. Responses options ranged from not at all (1) to extremely (10). This item was developed due to the low education level of the sample and the need for a measure that is easy to comprehend and low in complexity.

Smoking status and demographic characteristic

Respondents were asked to identify themselves as a current smoker or recent smoker, defined as having smoked within the past 12 months. Nicotine dependence was assessed by asking about the number of cigarettes smoked per day (CPD) and the time, in minutes, to the first cigarette of the day (TTFC) (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989). Demographic data were collected on sex, age, education level, and ethnicity. Because all respondents had incomes at 150% or less of the federal poverty level, comfort level with income was assessed (e.g. "comfortable" or "not enough to make ends meet") (Wu, Moser, Chung, & Lennie, 2008).

Procedure

IRB approval was obtained from the University of Kentucky Medical Institutional Review Board. Participants signed an informed consent. The self-report survey was administered by a trained research assistant. Responses to the survey were anonymous and voluntary.

Descriptive statistics were used to determine the demographic characteristics of the sample. Principal components analysis was conducted to evaluate dimensionality of the modified SEQ-12 using SPSS Version 17 (SPSS Inc, Chicago, IL). The Scree plot was used to determine the number of dimensions to retain and rotate using Varimax rotation in the final factor analysis. Cronbach's alpha was used to evaluate internal consistency reliability. Kolmogorow-Smirnov testing found age was normally distributed ($p = .052$), though other characteristics such as sex, education level, and income demonstrated non-normal distributions ($p \leq .001$). Because of non-normality of the data, Spearman's rho was used to explore interrelationships among the three self-efficacy measures (the SEQ-12 in original and modified forms and the 1-item self-efficacy measure) in current and former smokers.

Results

Demographic and smoking history characteristics of the sample are shown in Tables 3.1 and 3.2. The age range of participants was 20-73 years, and the mean age was 49.3 (SD ± 9.5). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were conducted on the sample without missing data (n=51) and found to be significant (KMO=.882, Sphericity $p < .001$) indicating the factor analysis was appropriate.

The initial principal components analysis suggested a 1-factor solution based on the eigennvalue greater than one rule. The scree plot clearly reflected a single factor. The items were evaluated to determine if there was consistency with previously designated internal and external subscales. The internal and external subscales were not distinguishable in this sample. The solution accounted for 73% of the item variance, regardless of whether the original SEQ-12 or the modified version was used in the analysis. KMO and Sphericity remained significant for both measures (Table 3.3). Cronbach's alpha was strong (.98) for both the modified and original versions of the SEQ-12 indicating possible item redundancy. Deletion of any one item did not change the alpha value.

Non-parametric testing for associations between the measures and smoking status was done because the Kolmogorow-Smirnov test statistics were less than 0.02 for each measure of interest, indicating a non-normal distribution. Spearman's rho for the

relationship between the modified and original SEQ-12 was .99, and slightly less but still moderately strong at .65 between the one item question and each of the modified and original versions ($p < .001$).

For the hypothesis that the self-efficacy measures would correlate positively with smoking status, Kruskal-Wallis tests demonstrated that each self-efficacy measure was associated with smoking status for current and former smokers ($p < .001$). Mean self-efficacy scores between current and former smokers for each of the measures showed significant differences (Table 3.4), with former smokers having higher self-efficacy scores. Former smokers ($n = 10$) in this sample responded to the single question, "How confident are you that you can quit and stay quit" with a mean score of 7.1 ($SD \pm 2.7$) versus a mean of 4.1 ($SD \pm 2.9$) for current smokers ($n = 59$).

Differences in mean SEQ-12 and the one item confidence to quit scores were significant between smokers planning to quit and those not planning to quit or already quit ($t50 = 3.5$, $p = .001$; $t65 = 3.2$, $p = .002$, respectively). Some responses were re-coded to include responses marked "other" that had a written in descriptor as no plan, plan, and already quit. Post hoc analysis results are summarized in Table 3.5.

Discussion

This analysis demonstrates acceptable reliability and validity of each of the measures of self-efficacy in this sample of medically ill, rural dwelling smokers. The two factor solution of internal and external components of self-efficacy reported in previous studies of the SEQ-12 was not demonstrated. Etter (2000) reported strong alpha's for each of the internal and external subscales of the SEQ-12 of .95 and .94, respectively. Cronbach's alphas for the Chinese version of the SEQ-12 were slightly lower but still strong at .88 for the internal measures and .77 for the external subscales (Leung et al, 2008). The fact that we did not find internal and external components of self-efficacy in the current study could be due to the relatively small sample size. Other explanations are possible. For example, non-response on items related to alcohol occurred on several surveys and these two items were both external factors. Multiple sources of bias in reporting alcohol use have been identified (Crawford, 1987) and cultural taboos related to alcohol for those living in dry counties with relatively high prevalence of conservative religious beliefs may explain the high number of omitted responses on the survey.

However, removing the alcohol-related items did not significantly change either the Cronbach's alpha or the significance of the differences in mean scores between current and former smokers.

Based on the characteristics of the sample, the literacy level and questionnaire burden needs to be considered. Thirty-three percent of this sample had less than a high school education and some respondents needed assistance completing the questionnaire due to low literacy skills. The fact that the SEQ-12 items were redundant and it had a strong correlation with the 1-item self-efficacy question supports the use of the less burdensome single item. In this analysis, additional items did not add significant information in measuring self-efficacy nor did they increase the strength of the association with current smoking status and intention to quit (plan versus no plan).

In the actual administration of the survey, some subjects needed verbal clarification of the items. Many respondents needed clarification regarding the meaning of the scale terms, as there was some confusion with the double-negative wording. Respondents were instructed to answer the items to the best of their ability and were strongly encouraged to make a choice but were also told they could skip items.

The key limitations of this study were the small sample size, missing data on the SEQ-12 scale, and the cross-sectional design. Convenience sampling limits generalizability of the findings. It was interesting that most of the respondents were female, limiting the ability to analyze the association between sex and study outcomes. Future research is needed to determine the relationship of sex and self-efficacy in this population. The use of a cross-sectional design precluded an analysis of the effect of timing on the measurement of confidence/self-efficacy on smoking abstinence and relapse in this population (Gwaltney et al., 2009).

Conclusion

Despite the small sample in this cross-sectional study, there was evidence of both reliability and validity of the quitting self-efficacy measures in this sample of medically ill, rural dwelling smokers. Based on the single factor solution, one question regarding confidence to quit and stay quit may provide an adequate measurement of quitting self-efficacy and be less burdensome in this population. While the tests of sampling adequacy were significant, it may be helpful to conduct further analysis with a larger sample.

It may be useful to consider self-efficacy to quit and to maintain abstinence by asking two separate questions instead of the one question used in this survey: "How sure are you that you could quit smoking?" and "How sure are you that you can stay quit?" Recent cessation studies address the need to focus on treatment of relapse (Hajek, Stead, West, Jarvis, & Lancaster, 2009). With participants in this sample having a high level of current smoking and an average of only 1.6 prior quit attempts, measuring both the confidence to quit and the confidence to stay quit are warranted for future study.

Medically ill smokers have much to gain by quitting smoking. Traditional approaches to cessation treatment, however, have not been successful in lowering prevalence rates of smoking in this group of medically ill, rural dwelling smokers. With a prevalence of current smokers in this study that is nearly twice the prevalence in the general Kentucky population, additional research into the development of both individual and population-tailored motivational counseling is needed to increase self-efficacy for smoking cessation in persons with smoking related illness. Developing succinct, easily understood and administered tools that measure self-efficacy throughout the quit process is a key consideration for predicting and promoting smoking abstinence and risk of relapse, particularly in disadvantaged populations with high rates of smoking.

Table 3.1. Demographic Characteristics of the Sample (N=70)

Characteristics	N	(%)
Sex		
Male	28	(40)
Female	41	(60)
Ethnicity		
Caucasian	55	(79)
African American	14	(20)
American Indian	1	(1)
Education		
Less than high school	23	(33)
High school	31	(45)
Post high school	15	(22)
Income		
Comfortable, just enough	11	(17)
Not enough to make ends meet	54	(83)
Current smoker	59	(85)
Recent former	10	(15)
Others in household smoke	42	(60)
Live in smoke-free community	18	(27)
Parents smoke/d in home	58	(88)

Table 3.2. Smoking Characteristics of the Sample (N=70)

Characteristics	**Mean ± SD**	**Range**
Cigarettes smoked per day	19.8 ± 13.8	1-70
Age of smoking initiation	17.8 ± 8.2	6-48
Number of quit attempts in past 12 months	1.6 ± 2.3	0-12
Time to first cigarette after waking (minutes)	23.9 ± 46.5	0-360

Table 3.3. Principal Components Analysis of the Modified SEQ-12 (n=51)

Item	Component 1
When something bad happens*	.91
After a meal	.88
When I feel nervous	.88
When having a drink with friends	.88
When I feel depressed	.86
When I feel anxious	.84
When I am with smokers	.83
When drinking beer, wine, alcohol	.82
When I feel the urge to smoke	.81
When having coffee/tea	.79
When I am celebrating	.79
When I am alone*	.76
When I am bored *	.72
When I am in pain*	.71
When I feel angry	.71
When I want to think about a difficulty problem	.61

*Items added to original SEQ-12

Table 3.4. Differences in Means of Self-Efficacy Measures by Smoking Status (Current /n=59 or Former /n=10)

Measure	Mean ± SD	Range	t	df	*p*-value
Confidence to quit			3.18	65	.002
Current Smoker	4.1 ± 2.9	1-10			
Former Smoker	7.8 ± 1.8	5-10			
SEQ-12			3.53	50	.0001
Current Smoker	25.0 ± 13.9	12-60			
Former Smoker	42.0 ± 15.5	28-60			
Modified SEQ-12			3.52	47	.0001
Current Smoker	33.6 ± 19.0	16-80			
Former Smoker	56.6 ± 19.9	37-80			

Table 3.5. Post Hoc Analysis of Differences in Means of Self-Efficacy Measures by Intent to Quit (No Plan/n=25, Plan/n=25, Already Quit/n=11)

Measure			Mean Difference	S.E	95% CI
Confidence to quit	no plan	already quit	-4.26*	.99	-6.65, -1.86
		future plan	-1.24	.78	-3.11, 0.63
	plan	no plan	4.26*	.99	1.86, 6.65
		already quit	3.02*	.99	0.62, 5.41
	already quit	no plan	1.24	.78	-0.63, 3.11
		future plan	-3.02*	.99	-5.41, -0.62
SEQ-12	no plan	already quit	-21.29*	5.25	-34.01, -8.56
		future plan	-1.11	4.46	-11.91, 9.69
	plan	no plan	21.29*	5.25	8.56, 34.01
		already quit	20.18*	5.44	6.98, 33.37
	already quit	no plan	1.11	4.46	-9.69, 11.91
		future plan	-20.18*	5.44	-33.37, -6.98

Note. SE=standard error; * $p \leq .05$

CHAPTER FOUR

Optimism and Planning to Quit Among Medically Ill, Rural Dwelling Smokers

Introduction

The purpose of this study was to explore factors which may predict planning to quit smoking in medically ill smokers in rural Kentucky. Kentucky has the highest rates of smoking in the nation. A little over one quarter of adult Kentuckians smoke, with prevalence as high as 36% in some rural regions (Centers for Disease Control and Prevention, 2010; Kentucky Institute of Medicine, 2007). In recent years a significant "leveling off" effect has been noted and certain subsets of the population continue to have staggeringly high rates of smoking (Chapman, 2007; Warner & Mendez, 2010). People who live in rural communities are one subset of the population who smoke at disproportionate rates and are more likely to be exposed to other people smoking in their home and at work when compared to their urban counterparts (Vander Weg, Cunningham, Howren, & Cai, 2011).

The harmful effect of smoking on health is well established (U.S. Department of Health and Human Services, 2010) and cigarette smoking affects nearly every organ system in the body. Yet, many medically ill smokers continue to smoke at high rates (Centers for Disease Control and Prevention, 2010). Not surprisingly, Kentucky has some of the highest rates of smoking related disease in the nation (Centers for Disease Control and Prevention, 2009; Kentucky Institute of Medicine, 2007). Medically ill smokers can disproportionately benefit from quitting (Critchley & Capewell, 2004) and tailored and targeted interventions aimed at specific physical and psychological needs have been shown to be effective in this population (Gritz, Vidrine, & Fingeret, 2007).

Research on smoking cessation in those with a chronic illness has been sparse (Gritz, et al., 2007) with significant gaps in the literature. Little is known about what motivates rural smokers, and specifically those with smoking related disease, to make a quit attempt. Multiple barriers to smoking cessation in rural regions have been identified, including intrinsic, health system, and social factors among medically ill smokers (Gregor & Borrelli, 2011; Hutcheson et al., 2008). These include limited access to services, limited financial resources, stress, perceived risk of illness, and social and cultural beliefs about tobacco use. Despite these challenges, interventions for decreasing

smoking prevalence have been shown to be successful in rural populations (Sheffer et al., 2009). The evidence for effective treatments in medically ill smokers however, is less clear and has been identified as a priority concern (Gritz, et al., 2007).

The factors influencing smoking and tobacco use behaviors are complex. Self-regulation is the ability of an individual to alter their behavior (Baumeister & Vohs, 2007) such as tobacco use, and successful self-regulation is linked to self-efficacy (Bandura, 1991) and outcome expectancies (Carver & Scheier, 1981; Rasmussen, Wrosch, Scheier, & Carver, 2006). Motivation and self-efficacy have been shown to influence participation in smoking cessation treatment (Gwaltney, Metrik, Kahler, & Shiffman, 2009; Lai DTC, Cahill K, Qin Y, & Tang JL., 2010)Self-efficacy provides motivation for change by enhancing goal setting (planning to quit), positive expectancies (optimism), and ability to deal effectively with environmental barriers and supports (Bandura, 2004). Self efficacy has been shown to correlate with number of quit attempts and the timing of its influence can vary, with the most salient effect when the cessation process is initiated (Baldwin et al., 2006).

Initiating quit attempts for persons with medical illness who continue to smoke can be influenced by many factors. The level of nicotine addiction has been associated with persistent smoking in persons with cancer (Schnoll et al., 2002). Persons initiating smoking at a young age have more difficulty quitting (Augustson & Marcus, 2004). Perceived risk of disease (Borrelli, Hayes, Dunsiger, & Fava, 2010) and risk minimization effects in smokers who have smoking related disease (Dias & Turato, 2006) have been shown to affect quitting in medically ill smokers. A prospective study of cessation in medically ill smokers found younger smokers had higher self-efficacy to quit and were more likely to try to quit than older smokers (Gregor & Borrelli, 2011).

Optimism appears to play a role in smoking and planning to quit (Pulvers et al., 2004) by influencing goal setting and persistence toward goal directed outcomes (Segerstrom & Nes, 2006). Positive expectancies, or optimism, influence the perceived severity of withdrawal symptoms during cessation and negative expectancies of the consequences of smoking predicted successful cessation early in the cessation process (Wetter et al., 1994). Unrealistic optimism and risk-minimization have been identified in smokers who underestimate the difficulty of quitting (Neil D. Weinstein, Slovic, &

Gibson, 2004), the overall risk of developing a smoking related illness (Borrelli, et al., 2010), and the risk of developing lung cancer (Dillard, McCaul, & Klein, 2006; N. D. Weinstein, Marcus, & Moser, 2005), which can negatively affect motivation to try to quit.

The purpose of this study is to explore and identify factors associated with planning to quit in a sample of medically ill, rural dwelling smokers with low income who report current, recent (quit less than 3 months) or former (quit more than 3 months) smoking.

The specific aims of the study were to:

1. To explore potential associations of nicotine dependence, age of initiation of smoking, confidence to quit, dispositional optimism, prior quit attempts, other smokers in the home, and type of illness with planning to quit smoking in this sample of medically ill, rural dwelling smokers.
2. To explore the predictors of confidence to quit, number of quit attempts in the past year, and dispositional optimism as measured by the LOT-R on intent to quit smoking in a sample of rural dwelling, low income, medically ill smokers, controlling for nicotine dependence, age of smoking initiation, other smokers in the home, ethnicity, level of education, age, and gender.

Method

Study Design

This study used a cross-sectional, non-experimental research survey design, completed between March 2010 and April 2011. Approval was obtained from the University of Kentucky Medical Institutional Review Board.

Seventy-two persons with medical illness who reported smoking in the past 12 months were recruited at a free clinic in rural Kentucky and invited to complete a self-report survey. The clinic serves approximately 200 rural Kentuckians who have chronic medical conditions, do not have health care or insurance, and are at 150% of the Federal poverty level or below. Approximately 50% of the clients and family members are current or former smokers.

Convenience sampling was done after initial screening for past 12 month smoking. Inclusion criteria were current or former smoking in the previous 12 months,

diagnosis of at least one chronic medical illness, and over 18 years old. Participants spoke English, were cognitively intact as evidenced by orientation and responses during clinical examination and were able to complete a brief paper and pencil survey.

Effort was made to equally balance gender and ethnicity, consistent with the regional population by asking all clinic attendees who smoked to participate. Ethnic minorities represent approximately 25% of the clinic population. Previous research has demonstrated underrepresentation of minority groups in research on medically ill smokers (Sun, Prochaska, Velicer, & Laforge, 2007; Warner & Burns, 2003) and not enough is known about potential ethnic differences. Participants received no compensation for completing the survey.

Data were collected via a paper and pencil survey from eligible persons who agreed to participate and signed an informed consent. Responses were voluntary and the surveys were anonymous. For subjects with limited literacy, a trained research assistant conducted a private interview at the clinic, reading the consent form and responses aloud and completing the research survey.

Measures

The brief survey generally took 5-15 minutes to complete. Sample items are listed in Table 4.1. Because patients are medically ill, brevity of the survey instrument was a consideration. Three subjects were unable to complete the survey at the clinic, and a self-addressed, stamped envelope was provided. One of these surveys was not returned and one was incomplete.

Demographic data collected included ethnicity, level of education, age, and gender. A subjective measure was used to assess comfort level with their current income: *Comfortable, I have more than enough money to make ends meet; I have just enough to make ends meet; or I do not have enough money to make ends meet*. This measure has been used in prior research (Wu, Moser, Chung, & Lennie, 2008) and was chosen due to the homogeneity of income levels in the sample.

Medical history was obtained by self-report, with basic categories of illnesses including cardiovascular (e.g. hypertension, history of myocardial infarction) or pulmonary disease (e.g. asthma, emphysema), diabetes, and gastroesophageal reflux

disease. The presence of "other medical problems" and "depression, anxiety, or other mental illness, such as bipolar illness or schizophrenia" was also collected.

Smoking history measures included current (or quit less than 3 months) and former (quit more than 3 months) smoking and the quantity of cigarettes smoked per day (CPD). Respondents were asked to list their approximate quit date. The number of days not smoking was calculated based on the survey completion date. Without the benefit of a prospective study, quit dates are subject to response bias, and this is an often noted limitation in retrospective studies of smoking and relapse (Shiffman, 2005). A conservative definition of former smoking (quit greater than 3 months) was used to measure prolonged abstinence because biochemical validation was not available for this study (Hughes, et al, 2003).

Time to first cigarette (TTFC) was used as a measure of nicotine dependence as this has been highly correlated with Fagerstrom Test of Nicotine Dependence scores (Baker et al., 2007), and cessation (Sun, et al., 2007). Based on criteria used in stage of change research (DiClemente et al., 1991), planning to quit was measured by responses to: *I have no plans to quit; I have already quit; I plan to quit in the next month; or I plan to quit in the next 6 months*.

Additional smoking related questions included number of quit attempts over the past 12 months and age at which smoking was initiated.

A single confidence to quit question: *On a scale of 1 to 10 how sure are you that you could quit smoking and stay quit?* 1 = not at all sure, 10=extremely sure was used to measure self-efficacy. In a recent analysis the one question item was highly correlated with the Self Efficacy Questionnaire (SEQ-12) in this sample (Darville, unpublished).

Data on other factors shown to influence smoking behaviors, such as parental smoking (Song, Glantz, & Halpern-Felsher, 2009), tobacco product marketing (Strasser, Tang, Tuller, & Cappella, 2008), exposure to smoke-free environments (Hahn, Rayens, Langley, Adkins, & Dignan, 2010) and social normative beliefs (Biener, Hamilton, Siegel, & Sullivan, 2010) were also collected, using questions about perceptions of friends and family regarding smoke-free laws .

The Life Orientation Test (LOT-R), found to be a valid and reliable measure of optimism (Scheier, Carver, & Bridges, 1994), was used to measure dispositional

optimism. The LOT-R is a 10-item scale including four filler items that are not used in the final scoring. Each item consists of a statement to which the respondent is to rate their answer on a 5-point scale, ranging from 0 (strongly disagree) to 4 (strongly agree). The central response (2) is termed "neutral". Scores range from 0 to 24.

Data Analysis

Based on the frequency of responses, planning to quit was considered a dichotomous variable: Planning to Quit (quit less than 3 months or planning to quit in the next 6 months) or Not Planning to Quit (no intention to quit). Of the 70 persons completing the survey, 8 had been quit for longer than 3 months and were considered to be stable quitters and were removed from the analysis with the final sample size of 62. Power analysis determined the power of the two-sample t-test would be at least 90% if the ratio of the difference in means to the standard deviation was as small as 0.8 with a sample size of 36 subjects in each of 2 groups and an alpha of 0.05 (Elashoff, 1995-2005).

Sample characteristics were examined using chi-square for categorical variables, and independent sample t-tests for continuous variables. Bivariate correlations were performed as indicated to test for significant associations between selection variables. Hosmer and Lemeshow's two-step model building procedure (Hosmer & Lemeshow, 2000) was used to determine variables to be included in a logistic model based on significant associations between the study variables and planning to quit. In the first step, univariate logistic regression analyses were performed to identify the unadjusted association between planning to quit and all study variables. In the second step, only variables associated with planning to quit ($p < .15$) were included in the final multivariate logistic regression model, similar to other studies (Johnson et al., 2010; Okoli et al., 2011). This higher confidence interval ($p \leq .15$) was used to minimize the potential for making a Type II error in the initial selection of variables to be included in the final model. The Hosmer-Lemeshow test assessed global goodness-of-fit in the final multivariate mode (with higher p-values indicating better fit of the model). Analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 18.0.

Results

Sample Characteristics

A summary of sample characteristics and the bivariate analyses are in Table 4.2. The sample was predominantly female (61%) and Caucasian (77%) with all participants at 150% of the poverty line or below. Mean age of the sample was 49.4 years ± 8.6 (range 24 – 62) and there was no significant difference in age between those with or without a plan to quit ($t60 = .121$, $p = .90$). The educational level was varied and higher than anticipated, with 49% having completed high school, 28% having less and 23% having more than a high school education. The majority (63%) had quit less than 3 months ago or were planning to quit, with the remaining 37% having no plan to quit at the time of the survey. There were no significant differences between those with and without a plan to quit on gender ($\chi2 = 1.28$, $df = 1$, $p = .26$), ethnicity ($\chi2 = .015$, $df = 1$, $p = .90$), or education level ($\chi2 = 1.37$, $df = 2$, $p = .50$).

Bivariate tests of association found significant differences in the number of prior quit attempts ($t59 = -3.41$, $p = .001$) and LOT-R scores ($t56 = -2.17$, $p = .034$) between those with and without a plan to quit. Those having a plan to quit had a greater number of prior quit attempts and higher optimism scores. However, the Cronbach's alpha of the LOT-R in this sample was moderate (0.53). There were no significant differences between groups on the nicotine dependence measures (CPD, TTFC), age of smoking initiation, self-reported heart, lung disease, diabetes or mental illness, or living with other smokers. As expected, CPD was negatively correlated with confidence to quit (lighter smokers having higher confidence to quit) for the full sample ($p = .023$), but this finding was not significant in either of the plan or no plan groups.

Predictors of Planning to Quit

Results of the initial univariate regression analyses for association of the variables with planning to quit were explored and results are in Table 4.3. Based on these findings, number of prior quit attempts in the previous 12 months, confidence to quit, and the LOT-R were included in the logistic model. The Hosmer-Lemeshow test was not significant ($\chi2 = 8.45$, $df = 8$, $p = .390$) and the model predicted 82.8% of the variance in planning to quit. The predictive ability of this model was stronger for those planning to quit (92.1%) than those not planning to quit (65%).

The number of prior quit attempts in the past 12 months and confidence to quit remained significant in the final model (see Table 4.4). Approximately 43.4% of the variance in planning to quit was explained by the model. Quit attempts in the past year more than doubled the likelihood of having a plan to quit in this sample. No significant correlations were found among the LOT-R, confidence to quit and prior quit attempts in the final model. Partial correlations of the factors included in the final model did not demonstrate significant interaction between the variables.

Discussion

Factors previously identified in the literature with planning to quit smoking in this sample of medically ill, rural dwelling smokers who have a known smoking related illness were fewer than expected. Of note, nicotine dependence variables (CPD and TTFC) were not associated with planning to quit in this sample. Previous research has found CPD but not TTFC to be consistently predictive of making quit attempts (Borland, Yong, O'Connor, Hyland, & Thompson, 2010). While age of smoking initiation was not significantly associated with greater likelihood of planning to quit, it is interesting that the mean age of those with no plan to quit (16.6) and the total sample (18.3) are similar to ages previously reported in a large population study as characteristic of hardcore smokers: 16.9 versus 18.3 for total current smokers (Augustson & Marcus, 2004).

No one smoking related illness (heart or lung disease), diabetes, or mental illness was associated with a greater likelihood of having a plan to quit. A higher percentage of persons with self-reported mental illness did report planning to quit (68%) but these did not reach the level of significance in this sample. The sample was homogeneous related to both socioeconomic status and the presence of at least one smoking related illness or condition for which smoking put them at increased risk to their health. It is should also be noted that the diagnoses were chronic and it cannot be determined if a greater likelihood of having a quit plan may have been associated with a newly diagnosed condition based on these data.

It is somewhat surprising that having heart or lung disease was not significantly associated with having a quit plan. Perceptions of vulnerability and benefits of quitting have been found to be associated with contemplating smoking cessation for persons with medical illness (Borrelli, et al., 2010). These findings suggest the specific illness type,

whether or not it is linked to smoking, may not be a key motivator for having a plan to quit. Perceived individual risk of smoking related illness complications or benefits of quitting related to specific health concerns could play a central role in promoting quit plans and was not evaluated in the current study but warrants further research. Concern has been raised that smoking cessation can be a low priority for practitioners when treating persons with multiple co-morbidities (J. E. Cohen, McDonald, & Selby, 2012).

The final predictive model did not demonstrate a significant effect for dispositional optimism as expected. Interestingly, there was an increase in the odds ratio for prior quit attempts from the initial univariate analysis to the final model in which optimism was no longer found to be significant (1.82 to 2.30), though dispositional optimism was not significantly correlated with quit attempts or confidence to quit. This suggests that optimism may have had a suppressive effect on the contribution quit attempts make to having a quit plan. The small sample size, missing LOT-R data on four participants and the moderate reliability of the LOT-R in this sample may have affected the power to detect a mediational effect in this sample at a level that reached significance. Response fatigue may have contributed to the moderate reliability and missing data as the LOT-R (10 items with 5 point rating) was placed immediately after the SEQ-12 (12 items with 5 point rating) on the survey.

Self-efficacy as measured by a self-assessment of confidence to quit in this sample was shown to be associated with quit attempts; which is consistent with the literature, however the timing of the assessment related to the quit attempt was not a part of this analysis. Timing of the self-efficacy assessment related to the quit process has been shown to affect the robustness of this association (Baldwin, et al., 2006; Gwaltney, et al., 2009). It should also be noted that having a quit plan, the outcome measure in this study, is not necessarily predictive of smoking abstinence, and further research using prospective data would be needed to help sort out these effects.

Additionally, the interpretation of "quit" can vary between respondents, and most studies now use terminology that includes "puff" language, such as "When is the last time you smoked, even a puff". A recent analysis comparing point prevalence (not smoking for one to two days prior) to prolonged abstinence (not smoking since quit date, sometimes allowing for lapses) reported a high correlation between these two measures

(Hughes, Carpenter, & Naud, 2010). "Puff" terminology was not used in the current survey, so the number and timing of prior quit attempts were not defined in a standardized manner and could have varied significantly from one subject to the next. A standard definition of quit (e.g. not even a puff for at least 24 hours) should be used in future research.

The major limitations of this study are the small sample size and survey methodology using cross-sectional data, limiting the ability to demonstrate predictive effects of the factors of interest on the quitting process. A combined group of 72 subjects (36 in each comparator group) and an alpha level of .05 would be needed to have sufficient power to detect a significant association of at least 85%, and to detect a correlation as small as 0.35, which is considered slightly larger than a medium effect size (J. Cohen, 1988). Power estimates were obtained using nQuery Advisor and this was the intended sample size (Elashoff, 1995-2005). However, due to incomplete surveys, only 62 subjects (39 planning to quit and 23 with no plan) were included in the analysis.

As noted, timing of an effect in relation to the quit process is an important consideration related to several of the variables tested and was not accounted for in this study. Convenience sampling is a concern, however given the specific targeted characteristics for the analysis and the homogeneity of the clinic population, the effect on selection bias in the analysis should be minimized. Reliance on self-report can also be a limitation, however related to the outcome respondent perception was the key concern. With smoking and illness, perception has been demonstrated to drive behavioral change (Park et al., 2009).

Conclusion

Quit attempts and confidence to quit predicted having a plan to quit in this preliminary study of medically ill, rural dwelling smokers. Dispositional optimism, while not significantly predictive of having a plan to quit, was associated with this outcome but the nature of the association remains unclear. Associations have been identified between Harm Avoidance as a character trait and persistent smoking (Etter, 2010) and optimistic bias (meaning low perceived risk of harm) and persistent smoking in smokers with medical illness (Borrelli, et al., 2010). Promoting quit attempts and sustaining interest in

cessation is critical, particularly in marginalized populations, for reducing the harmful effects of smoking on those with medical illness.

The findings of this study demonstrate the factors that promote an interest in quitting and the proportion of smokers planning to quit are not markedly different than in the general population. This suggests that high prevalence rates of smoking in rural dwelling, medically ill smokers could be due to limitations in access to evidence based cessation treatment and not inherent characteristics of the smokers themselves. Caution has been raised that by focusing on the characteristics of the persistent smoker, victim blaming that has a detrimental effect on promoting equal access to treatment can result (J. E. Cohen, et al., 2012). Current evidence based treatment recommends working with all smokers to develop discrepancies between risks of smoking/benefits of quitting and the individual's current state to promote quit attempts (Fiore, Jaen, Baker, & et al, 2008).

What is dissimilar in these findings is the lack of predictability of other intrinsic and sociocultural factors. The small sample size could have reduced the power of this study to detect additional significant factors. For example, there is clearly an underlying culture shift in Kentucky regarding tobacco which may be contributing to an increase the number of persons planning to quit. The general social milieu, even in Kentucky, related to persistent smoking has changed significantly over the past few decades. The increased cost of cigarettes and a growing number of smoke-free efforts communities have helped increase cessation rates (Centers for Disease Control and Prevention, 2011) and public awareness of the hazards of tobacco smoke has increased (Oncken, McKee, Krishnan-Sarin, O'Malley, & Mazure, 2005).

Yet smoking rates among rural dwelling persons, particularly those with medical and/or psychiatric illness remain disproportionately high. It is significant to note that 63% of the current smokers in this relatively hardcore group were planning to quit. Based on these findings, promoting quit attempts and counseling to increase confidence to quit can be effective strategies with potential to significantly impact the toll of smoking in this high risk population. The question remains whether planning is associated with greater (or potentially less) smoking abstinence and this warrants further research. In a time where smoking cessation treatment has seen significant budget cuts, increasing access to evidence based treatment has become more challenging.

Smoking cessation treatment remains effective and cost-effective, and evidence based approaches should be used in the health care setting for all smokers, even those unwilling to quit (Fiore & Baker, 2011). A meta-analysis found treating smokers with nicotine replacement prior to their quit date is an effective strategy to increase quit rates (Shiffman & Ferguson, 2008). Additionally a recent randomized controlled trial found using nicotine replacement to promote quit attempts in persons not motivated to quit promoted quit attempts by increasing motivation and confidence to quit (Carpenter et al., 2011). These medication supported practice quits were recommended as a novel strategy to increase quit attempts and ultimate cessation.

Tobacco use remains the single leading preventable cause of death and disease in our nation and the world. Levels of confidence and reasons for planning to quit in this high risk sample is consistent with those seen in other studies of people who smoke. Even smokers in high risk settings clearly want to quit and health care/smoking cessation treatment providers can provide the tools they need for success.

Table 4.1. Sample Survey Items

How many cigarettes a day do you/did you smoke, on average, per day? Your best guess is fine.			
How many minutes after you wake up in the morning do you/did you, have your first cigarette? Your best guess is fine.			
How many times have you tried to quit smoking in the past 12 months? *Enter 0 if none.*			
Which of the following best describes your plans to quit smoking? Circle one.			
1.	I have no plans to quit	4.	I plan to quit in the next 6 months
2.	I have already quit	5.	Other (specify)
3.	I plan to quit in the next month		_____
Do you have any of the following medical problems? Circle all that apply.			
a.	Heart disease or problems with circulation, such as a heart attack, blood clot, bad circulation, high blood pressure	d.	Stomach problems, such as acid reflux, ulcers, heartburn
b.	Lung disease, such as COPD, chronic bronchitis, asthma or emphysema	e.	Depression, anxiety, or other mental illness, such as bipolar illness or schizophrenia
c.	High sugar/diabetes	f.	Other medical problem (please list)
			_____
			_____

Table 4.2. Sample Characteristics (N=62)

	Total (N = 62)	No Plan (n = 23)	Plan (n = 39)	Difference[a]
Continuous variables	Mean ± SD	Mean ± SD	Mean ± SD	*p*
Age	49.4 ± 8.6	49.6 ±7.9	49.3 ± 8.69.1	.904
Cigarettes per day	18.7 ± 11.3	19.5 ± 11.7	18.3 ± 11.2	.697
Age of smoking initiation	18.3 ± 8.5	16.6 ± 6.9	19.3 ± 9.2	.231
Confidence to quit	4.1 ± 2.8	3.4 ± 2.7	4.6 ± 2.8	.117
Past 12 month quit attempts	1.7 ± 2.4	.65 ± 1.3	2.4 ± 2.6	.001*
Time to first cigarette (minutes)	25.1 ± 49.1	18.0 ± 22.3	29.3 ± 59.5	.388
LOT-R	11.5 ± 4.7	9.8 ± 5.5	12.5 ± 3.9	.034*
Categorical variables	n (%)	n (%)	n (%)	
Quit ≤ 3 months	6 (10)	0	6 (15)	
Not Quit	56 (90)	23 (100)	22 (85)	
Male	24 (39)	11 (48)	13 (33)	.258
Female	38 (61)	12 (52)	26 (67)	
Caucasian	48 (77)	18 (78)	30 (77)	.903
Non Caucasian**	14 (23)	5 (22)	9 (23)	
Less than high school	17 (28)	8 (36)	9 (23)	.504
High school	30 (49)	9 (41)	21 (54)	
Post high school	14 (23)	5 (23)	9 (23)	
Income:				.290
Just enough to make ends meet	10 (17)	2 (10)	8 (21)	
Not enough to make ends meet	48 (83)	18 (90)	30 (79)	

Table 4.2 (Continued)

	Total (N = 62)	No Plan (n = 23)	Plan (n = 39)	Difference[a]
	n (%)	n (%)	n (%)	
Cardiovascular disease	43 (70)	17 (40)	26 (60)	.550
Pulmonary disease	20 (32)	5 (25)	15 (75)	.174
Diabetes	18 (29)	6 (33)	12 (67)	.695
Mental Illness	28 (48)	9 (32)	19 (68)	.437
Parents Smoked in Home	51 (88)	18 (35)	33 (65)	.726
Others in Household Smoke	39 (63)	15 (39)	24 (62)	.772
Live in Smoke-Free Community	16 (28)	7 (44)	9 (56)	.573

[a]Difference between groups was based on chi-square analysis for categorical variables and independent sample t-tests (with Levine's test for unequal variances) for continuous variables

*Significant group difference

**All non-Caucasians were African American with the exception of 1 American Indian

Table 4.3. Unadjusted Analyses of Planning to Quit (N=62)

Variable	Odds Ratio	95% CI	*p*
Age	.996	.938 – 1.059	.902
Cigarettes per day	.991	.946 – 1.037	.691
Age of smoking initiation	1.046	.970 – 1.128	.239
Confidence to quit	1.169	.960 – 1.422	.119*
Past 12 month quit attempts	1.818	1.177 – 2.808	.007*
Time to first cigarette (minutes)	1.007	.989 – 1.025	.426
LOT-R	1.153	1.006 – 1.321	.041*
Gender (reference Male)	.545	.190 - 1.566	.260
Ethnicity (reference not Caucasian)	.926	.268 – 3.198	.903
Less than high school (reference more than HS)	.625	.147 – 2.664	.525
High school (reference more than HS)	1.296	.338 – 4.968	.705
Income (reference not enough to make ends meet)	.417	.080 -2.183	.300
Cardiovascular disease	1.417	.451 – 4.449	.551
Pulmonary disease	.444	.136 – 1.450	.179
Diabetes	.794	.251 – 2.515	.695
Mental Illness	.656	.226 – 1.906	.438
Parents Smoked in Home	1.364	.240 – 7.750	.726
Others in Household Smoke	1.172	.401 – 3.428	.772
Live in Smoke-Free Community	1.400	.434 – 4.521	.574

*Significant at $p \leq .15$ and placed in final model

Table 4.4. Final Model Predictors of Having a Plan to Quit (N=58)

	Odds Ratio	95% CI	p
Past 12 month quit attempts	2.303	1.298 – 4.085	.004*
Confidence to quit	1.377	1.054 – 1.799	.019*
LOT-R	1.132	.984 – 1.302	.084

*Significant at $p < .05$

CHAPTER FIVE

Conclusions and Implications

The purpose of chapter seven is to summarize and synthesize the findings of this dissertation and provide implications for clinicians and researchers. Symptoms are a distinctive feature of heart failure (HF) and substantially influence outcomes.[1-4] Despite the importance of symptoms in this population, there are few investigations regarding how, and with which instruments, to accurately assess patients' symptom experiences.

This chapter summarizes the findings of the manuscripts comprising the dissertation and begins with reviewing the results of the literature review, measurement, and main findings papers. Based on this summary, conclusions about the contribution of these works to the literature on smoking cessation with medically ill smokers who persist in smoking will be presented. Finally, implications for future research, practice, and smoking cessation policy will be discussed.

Summary of Findings

Defining and quantifying persistent or hardcore smokers is not currently possible due to varying definitions of these smokers in current research. Having high levels of nicotine dependence has often been cited as a defining characteristic of hardcore smokers. There is concern that the use of diverse measures of dependence (e.g. cigarettes per day (CPD), time to first cigarette (TTFC), Fagerstrom Test of Nicotine Dependence) has confounded this smoking characteristic. Measures that do not rely solely on CPD have been recommended (Hughes, 2011). Another consistent finding is an association between hardcore smoking and smoking initiation at an early age (Augustson & Marcus, 2004; Jarvis, Wardle, Waller, & Owen, 2003).

Hardcore smokers are also characterized as not contemplating quitting (Anatchkova, Velicer, & Prochaska, 2006; Ladwig, Baumert, Lowel, Doring, & Wichmann, 2005). As discussed at length in the literature review, the reasons for this are very complex. Many studies use a stage based model, and contemplation is related to the Decisional Balance between the pros and cons of quitting and/or smoking. Precontemplators are described as having either limited knowledge about the

consequences of their smoking behavior or as having low self-efficacy or confidence in their ability to change (Prochaska, 2008). Stage-based models may not be the best framework for understanding this complex phenomenon. Additional studies indicate that the characteristics associated with behavior change in smokers not contemplating quitting are more complex and may involve motivation, optimism, and disengagement (Dijkstra & De Vries, 2000).

Disparities in smoking prevalence have persisted over time in certain subgroups of the population (Warner, 2007). One group that continues to smoke at high levels and also bears the burden of smoking-related consequences is smokers with medical illness (Gregor & Borrelli, 2011). For medically ill hardcore smokers, many studies describe the concept of risk minimization, or an unrealistic optimism effect, in which the health risks of smoking are minimized (Dillard, McCaul, & Klein, 2006; Emery, Gilpin, Ake, Farkas, & Pierce, 2000). This effect has been described in both healthy smokers and in those with smoking related illness (Oncken, McKee, Krishnan-Sarin, O'Malley, & Mazure, 2005).

The second manuscript explored the reliability and validity of measures of self-efficacy and confidence to quit in a sample of medically ill, rural dwelling adult smokers. The self-reported survey included an instrument previously found to be reliable and valid in smokers with and without medical illness; the Smoking Self-Efficacy Questionnaire (SEQ-12) (Etter, Bergman, Humair, & Perneger, 2000; Leung, Chan, Lau, Wong, & Lam, 2008). The survey included a modified version of the SEQ-12 based on the author's clinical experience working with this group of medically ill smokers, and a 1-item confidence to quit measure developed by the author. There was strong correlation between the SEQ-12, the modified SEQ-12, and the 1-item measuring confidence to quit. The measures were found to be reliable and valid in this sample. Additionally, the scores on all three self-efficacy measures were significantly different for those with a plan versus no plan to quit. The study found smokers with no plan to quit reported lower self-efficacy and confidence to quit scores than those without a plan to quit.

The main study explored factors associated with planning to quit smoking among this same group of medically ill, rural dwelling adult smokers. The two factors that were predictive of planning to quit were the number of previous quit attempts and confidence to quit. These findings are consistent with the self-regulation model (Segerstrom, 2006)

in that for persons having a goal (planning to quit), movement toward that goal involves self-efficacy (confidence) and action toward the goal (making quit attempts). The level of nicotine dependence, as measured by cigarettes per day and time to first cigarette were not associated with planning to quit. This is inconsistent with findings summarized in the literature review and may be related to relatively little variation in CPD (about a pack a day) or TTFC (less than 30 minutes) within this group of smokers. The same lack of variability may be why no specific medical illness (e.g. heart disease, lung disease) was associated with planning to quit.

Conclusions

Persons of low socioeconomic status and those with medical illness smoke at disproportionately high levels (Centers for Disease Control and Prevention, 2010). This was true in this study sample, where 45% of the persons with chronic medical illness served in the free clinic were current smokers. In the study sample, 90% were current smokers; 63% reported they were planning to quit. This is similar to findings in the general population that 70% of smokers want to quit (Centers for Disease Control and Prevention, 2011).

The most important factor found to predict planning to quit was having made prior quit attempts. While this may seem intuitive, having made a prior quit attempt could imply experiencing a failure to achieve the expected goal (smoking abstinence). A chronic disease model which promoted multiple quit attempts and did not treat quit attempts not resulting in prolonged abstinence as failures has been associated with both short and long term smoking abstinence in the general population (Joseph et al., 2011). Having low intention to quit has been shown to predict a failure to make quit attempts (Ip et al., 2012). The current study explored the opposite scenario; the positive effect of making quit attempts on intent to quit. This implies a feedback effect, similar to that seen in self-regulation may be a better way to view the relationship between quit intention and quit attempts. Prochaska (2008) suggested Precontemplators underestimate the pros of quitting and overestimate the cons, and may be demoralized by failed quit attempts. However in the study sample, the opposite case was found. Persons making prior quit attempts were over twice as likely to plan to quit (again). Optimism was significantly associated with planning to quit in the univariate model; however it the reliability of the

measure in this sample was moderate and it was not found to be a significant predictor variable in the final model. Further exploration of this personality variable with a larger sample studied over time could provide additional insights into the role of optimism in planning to quit and actual quit attempts. Validity and reliability testing of the LOT-R and a lower literacy version in this population may be important for future research with this population.

Hardcore smokers are frequently described (and most likely thought of) as having very low confidence in their ability to quit smoking (Costa, 2010). In this sample, current smokers had smoked an average of a pack a day for nearly 30 years, and continued to smoke despite being diagnosed with either a smoking related illness (heart or lung disease) or an illness that would be adversely affected by smoking (diabetes). Those having no plan to quit had confidence levels only slightly below the mean (3.4 ± 2.7 versus 4.1 ± 2.8) and confidence to quit in the final model predicted an increase in planning to quit (OR 1.38, CI = 1.054 – 1.799).

Implications for Future Research

The debate about the hardening of current smokers persists. A recent commentary raised concern that focusing on the hardening process promotes a victim blaming approach in which persons who continue to smoke are further marginalized and blamed for their illness (Cohen, McDonald, & Selby, 2012). Provider bias (i.e., giving less advice to quit) has been identified with certain groups of medically ill smokers who persist in smoking (Huang, Britton, Hubbard, & Lewis, 2012). Further studies with medically ill smokers focusing on their experiences with quit attempts including communications with healthcare providers could provide valuable insights into developing and testing more culturally appropriate treatment approaches. Clearly, medically ill smokers try to quit, but how they are trying, what support they are receiving, and how quit attempts influence their plans to continue the process of quitting need further study. Having answers to these questions could help target and tailor cessation treatment for these high risk smokers.

The leveling off of smoking prevalence and cessation rates has raised concerns that new methods are needed to study smoking cessation. As discussed in the literature review, inconsistent definitions and measures have clouded the understanding of hardcore smoking. Using more consistent measures and a unifying framework is clearly needed

(Docherty & McNeill, 2012). A model of tobacco cessation has been proposed that preserves the framework of the TTM using the terms precessation (Preparation), cessation (Action), and Maintenance (Baker et al., 2011). This model differs from more traditional models by characterizing Precontemplation/Contemplation as a pre-quit phase labeled "Motivation" which continues for an indefinite time period. This phase is described as having a goal to increase quit attempts and quit attempt success using both individual and systems level interventions. Recommended outcome measures for this phase include quit intention, quit attempts, and quitting success.

The contribution of this study is the finding that quit attempts and confidence to quit influence intention to quit among medically ill, rural dwelling smokers. Self-regulation, including the interaction between outcome expectancies and self-efficacy provides a useful framework to explore the facets of motivation that are most salient in promoting plans to quit smoking. Because timing has been found to elicit a different effect of self-efficacy on quit attempts (Baldwin et al, 2006), longitudinal studies would be helpful to evaluate if this is also the case in medically ill smokers. For medically ill smokers, a 1-item confidence to quit measure was found to be reliable and valid and reduces both the burden on participants as well as concerns about literacy with current, lengthier instruments.

Implications for Practice

Well established, evidence-based smoking cessation treatment guidelines exist (Fiore, Jaen, Baker, & et al, 2008). The first step in evaluating their effectiveness in persistently smoking subgroups, such as in this sample of medically ill smokers, is to make certain they are consistently implemented (Fiore & Baker, 2011). Similar to the Massachusetts Medicaid experience where only 37% of smokers took advantage of the smoking cessation benefit (Land et al., 2010), the participants in this study were all offered evidence-based treatment but not all of those expressing intention to quit requested smoking cessation support. If quit attempts are influenced by quit intention in hardcore smokers (Ip et al., 2012) and quit attempts promote quit intention as found in this current study in medically ill smokers, it is imperative that health care providers promote quit attempts with every smoker at every encounter. High risk populations need

to be consistently targeted with cessation assistance tailored to their specific physical and psychological needs.

Implications for Smoking Cessation Policy

Disparities clearly persist in access to effective cessation treatment, including motivational counseling which can promote quit attempts, particularly for socioeconomically disadvantaged smokers (Docherty & McNeill, 2012; Murray, Bauld, Hackshaw, & McNeill, 2009). This study found that quit attempts are an important component of planning to quit in medically ill smokers. Yet many factors influence quit attempts and these have been the source of debate in smoking cessation policy (Zhu, Lee, Zhuang, Gamst, & Wolfson, 2012). For example, there is concern that the "medicalization" of smoking cessation may reduce self-efficacy in smokers by promoting the belief that medication must be used to quit. When medication is not available, smokers may not make quit attempts (Chapman & MacKenzie, 2010) despite clear evidence that medications increase the success of quit attempts (Fiore, et al., 2008). The use of medications for quit attempts was not explored in the current study but would be of interest for future research of medically ill smokers, a group that already uses medication to address other health related concerns.

In summary, this dissertation adds several new insights into persistent smoking in medically ill, rural dwelling smokers that warrant further consideration and research. First, using the term hardcore smoker is not adequately defined and has significant limitations. This terminology has been shown to have unintended consequences of limiting provider advice to quit which is significant for medically ill smokers who interact regularly with the health care system. Hardcore implies unwillingness to change and points to the person as the object of resistance to cessation. If smoking is conceptualized as a chronic process, persistence in smoking can be viewed as a more global resistance to cessation methods. Second, a 1-item measure of self-efficacy was shown to be reliable and valid in these smokers for whom response burden and literacy levels can be a concern. Finally, the finding that quit attempts more than double the odds of planning to quit makes a strong case that tailoring messages promoting a more proximal endpoint (quit attempt) over the more distal one (success at quitting) could increase eventual smoking cessation rates in this high risk group of smokers. Further

exploration of factors that promote quit attempts, including the potential mediational effect of optimism and self-efficacy is warranted.

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Year	**Institution**	**Academic Position**
12/2008-present	University of Kentucky, College of Nursing, Lexington, KY	Assistant Professor, Clinical Title Series
8/2007-present	University of Kentucky, College	Research Assistant/

	of Nursing & Department of Psychology Lexington, KY	Consultant
9/1999-12/2006	University of Kentucky	Clinical Preceptor
6/1999-12/2006	Eastern Kentucky University, Richmond, KY	Clinical Preceptor
8/1993-5/1998	Midway College, Danville Extension Danville, KY	Adjunct Faculty

Scholastic and professional honors

Year	Honors	Institution
1978	Graduated Cum Laude	Valparaiso University
1998	Summa Cum Laude	University of Kentucky
April 1998		Sigma Theta Tau
8/2007-12/2008	Rural Cancer Control Training Project Fellowship	University of Kentucky
May 2011	Excellence in Clinical Practice	University of Kentucky College of Nursing

Professional Publications

Hahn, E.J., Rayens, M.K., Langley, R., Darville, A., Dignan, M. (2009). Time Since Smoke-free Law and Smoking Cessation Behaviors. Nicotine and Tobacco Research 11(8).

Segerstrom, S.C., Roach, A.R., Evans, D.R., Schipper, L.J., Darville, A.K. (2010). The structure, validity, and correlates of trait repetitive thought in older adults. Psychology and Aging 25(3).

Audrey Darville

Signature