Commentary

Light and intermittent smoking: The road less traveled

Pebbles Fagan & Nancy A. Rigotti

Introduction

Tobacco control research is at a crossroads. Increasingly, investigators, policy makers, and practitioners recognize the need for concerted efforts to reduce smoking around the globe and across the entire spectrum of smokers. Research and public health efforts have targeted primarily moderate to heavy smokers and those who smoke every day. The National Household Interview Surveys that have monitored U.S. tobacco use since the 1960s did not even distinguish between daily and nondaily smoking until 1992 (Centers for Disease Control and Prevention [CDC], 1994). Our interventions, theoretical frameworks, and concepts of addiction and quitting processes were modeled on heavy daily smoking. Because the frequency, intensity, and duration of tobacco exposure are related in a dose-dependent manner to the risk of health consequences, this strategy focused on those smokers at highest risk of tobacco-related disease.

However, no level of cigarette smoke is safe (U.S. Department of Health and Human Services [USDHHS], 2006). Even secondhand smoke exposure in children of light smokers has been associated with the biologically effective dose of two known carcinogen–protein adducts and general measures of genetic damage (Tang et al., 1999). Tobacco consumption among current smokers has declined over several decades (Orzechowski & Walker, 2003), and one-fifth of U.S. smokers are now intermittent or occasional smokers, defined as non-daily smokers (CDC, 2007). Many smokers, especially those in low- and middle-income countries, may be light smokers (i.e., smoking < 10–15 cigarettes/day). If we are to curb the global tobacco pandemic, that is, avoid 1 billion tobacco-related deaths in the 21st century (World Health Organization [WHO], 2008), then nicotine and tobacco researchers and researchers from other fields must expand their focus and make a concerted effort to reduce light and intermittent smoking as well as heavy, daily smoking.

This paradigm shift is made more urgent by ongoing trends that forecast an increase in the overall proportion of light and intermittent smokers in the U.S. population and globally. By 2050, it is projected that 50% of the U.S. population will comprise

Hispanics/Latinos, Blacks/African Americans, American Indians, Alaska Natives, Asian Americans, and Pacific Islanders. In these racial and ethnic groups, light smoking has historically been a dominant phenomenon. Long-term trends show that more than 50% of Blacks and Hispanics, irrespective of gender, age, or educational status, smoke fewer than 15 cigarettes/day and that light smoking has increased over the years in these populations (USDHHS, 1998). American Indians report smoking on average 10 cigarettes/day (Eichner et al., 2005). Similar patterns have been observed among Asian Americans, Pacific Islanders, and Alaska Natives (USDHHS, 1998). If historical patterns of smoking consumption among these racial and ethnic groups persist as their share of the U.S. population grows, the proportion of light and intermittent smokers in the United States will increase overall.

Indeed, light smoking may become a more common smoking pattern with the rapid increase in tobacco use around the globe. Tobacco use is increasing more rapidly in economically developing countries than in developed countries, and more smokers live in low- and middle-income countries than in high-income countries (WHO, 2003). Smokers who live in poverty smoke fewer cigarettes per day compared with those who live at or above the poverty line (CDC, 2007), making it possible that the global expansion of tobacco use will generate an increase in the proportion of light and intermittent smokers worldwide. The global spread of effective tobacco control policies called for by the WHO Framework Convention on Tobacco Control and MPOWER report (WHO, 2008) is likely to produce quitting among some smokers while others reduce to light and intermittent smoking. These projections suggest that embedded in the tobacco pandemic is an impending pandemic of light and intermittent smoking.

The turning point

Light and intermittent smoking represents a road less traveled in nicotine and tobacco research. It is now time for our field to broaden its focus to address interventions, theories, measurement, and the harm due to light and intermittent smoking.

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In August 2005, the National Cancer Institute and the American Legacy Foundation convened 29 researchers to examine the existing science, discuss gaps in research, and develop research recommendations to advance the science on light and intermittent smoking. *What's in a Name? Examination of Light and Intermittent Smokers* was the first meeting of its kind to address the heterogeneity of smokers. This meeting was cochaired by Drs. Donna Vallone, Deirdre Lawrence, and Pebbles Fagan, and planning committee members included Drs. Cathy Backinger, Patty Mabry, and Stephen Marcus. During the meeting, which lasted a day and a half, participants examined eight scientific areas relevant to light and intermittent smoking: (a) definitions of light and intermittent smoking, (b) initiation of and transitions to light and intermittent smoking, (c) sociodemographic and psychosocial characteristics, (d) concurrent use with other tobacco- and nicotine-containing products, (e) tobacco dependence, (f) quitting patterns, (g) morbidity and mortality outcomes, and (h) demand, availability, and access to policy and programmatic interventions. Participants developed more than 100 recommendations at the meeting (USDHHS, 2008). One of these recommendations was to publish a special issue of a journal to increase our understanding of how to reduce smoking among light and intermittent smokers.

This special issue, *Light and Intermittent Smoking*, is a product of that initiative. Co-funded by the National Cancer Institute, the American Legacy Foundation, the National Institute on Drug Abuse, and the National Institutes of Health Office of Behavioral and Social Sciences Research, this issue of *Nicotine & Tobacco Research* includes 13 original articles on light and intermittent smoking that examine prevalence, trajectories, transitions, characteristics, smoking situations, dependence, and health outcomes. These papers were the product of an open call for papers, and each underwent the journal's standard peer review process.

Two additional commentaries were invited. One by Dr. Saul Shiffman describes the historical context of light and intermittent smoking. Another, by Dr. Corinne Husten, reviews the measures of light and intermittent smoking and grapples with the challenges to developing a consistent definition of these smoking patterns. She finds that the distinction between daily and nondaily smoking is relatively straightforward and useful. In contrast, light smoking has been defined inconsistently and measures of daily cigarette consumption are not necessarily markers of reduced tobacco exposure, nicotine dependence, disease risk, or likelihood of success with interventions.

Highlights

Smoking patterns

Many papers in this issue used national and state survey data to examine light and intermittent smoking patterns. Trinidad et al. used the Tobacco Use Supplement to the Current Population Survey (TUS-CPS) to confirm that light and intermittent smoking is more prevalent among Blacks and Hispanics or Latinos compared with Whites. Tong, Nguyen, Vittinghoff, and Pérez-Stable, using the California Health Interview Survey, found light and intermittent smoking to be more prevalent among Asian American and Pacific Islander smokers than among non-Hispanic White smokers, even after adjusting for education, age,

and race. Both studies further examined the patterns of light and intermittent smoking within these ethnic groups. Within Asian ethnic groups, intermittent smokers were more likely to be younger, but education and gender effects differed. Females were more likely to be light smokers (≤ 5 cigarettes/day) across Asian ethnic groups, but age and education effects were less clear in these groups than among non-Hispanic Whites. Another paper, by Rutten, Augustson, Doran, and Moser, used the Health Information National Trends Survey to examine the information-gathering patterns of light and intermittent smokers. Their analysis also demonstrated that light and intermittent smokers were more likely to be younger, female, better educated, and from a minority racial/ethnic group.

Reflecting the international nature of light and intermittent smoking, the issue includes one paper, by Boulos et al., that analyzed smoking in Egyptians. In Egypt, an economically developing country, light and intermittent smokers resembled their U.S. counterparts in some ways but not others. Among Egyptian males responding to a population-based community survey, light daily smokers tended to be single, younger, and better educated, compared with heavy daily smokers.

Trends and transitions over time

Another group of studies examined trajectories and transitions in light and intermittent smoking. Longitudinal cohorts of smokers need to be followed over time to determine the health risks for light and intermittent smokers who may have stable or unstable patterns of light and intermittent smoking and transitions to heavier or lighter smoking. Few such analyses exist, and this issue highlights several papers that address this important question.

White, Bray, Fleming, and Catalano analyzed a large cohort of adolescents who were followed into early adulthood. They found that nonsmoking and heavy smoking were relatively stable behaviors but that light and intermittent smoking was not. Only 31% of light and intermittent smokers in the 10th grade were still in this category 4 years later. Levy, Biener, and Rigotti followed a population-based cohort of adults more than 4 years to identify transitions and predictors of change. Although light smoking (≤ 10 cigarettes daily) was a much less stable pattern than heavier smoking, only a minority of light smokers progressed to heavier smoking more than 4 years; light smokers who increased consumption were more likely to exhibit signs of nicotine addiction and to be in a social environment conducive to smoking. For the very lightest smokers (≤ 5 cigarettes daily), the frequency of smoking was the major predictor of progression; very light daily smokers were more likely to progress to higher levels of cigarette consumption than were intermittent smokers. In a third paper, Fagan, Rubenstone, Zhang, and Brooks found that Black and Puerto Rican youth's maladaptive characteristics and light smoking in adolescence predicted light smoking in young adulthood.

Pierce, White, and Messer analyzed four waves of the TUS-CPS to examine population trends in the prevalence of very light smoking (< 5 cigarettes/day) over a decade. Smoking prevalence declined at all levels of cigarette consumption among Americans aged 30 years or more, but among young adults (18–29 years), light and intermittent smoking increased. Their analysis also demonstrated an association between tobacco

control policies and light and intermittent smoking. Smokers who lived in a smoke-free home or in a state with stronger tobacco control policies had higher odds of being light smokers. Among young adults, the increase in light smoking was mediated by the increase in smoke-free homes.

Nguyen and Zhu analyzed data from the California Tobacco Survey to explore how transitions from daily to nondaily smoking might occur among young adults. They found that formerly daily and never-daily intermittent smokers were similar with regard to situations in which they will smoke, suggesting that some daily smokers are able to control their use of the addictive substance nicotine.

Nicotine dependence

Two studies using different methods examined the relationship between measures of cigarette consumption and nicotine dependence in different subgroups of light smokers. In a controlled laboratory experiment, Rubinstein, Benowitz, Auerback, and Moscicki assessed subjective and objective signs of nicotine withdrawal after 24 hr of abstinence among very light adolescent smokers, defined as those smoking five or fewer cigarettes per day. They found no withdrawal symptoms among the very lightest smokers (i.e., 1–3 cigarettes/day), whereas those who smoked 4–5 cigarettes/day had subjective symptoms but not objective signs of nicotine withdrawal after 24 hr of tobacco abstinence.

Reitzel et al. analyzed data from a clinical trial of telephone counseling for Hispanic/Latino smokers. In this group, lighter smokers reported less nicotine dependence and less craving when they tried to quit, but contrary to expectations, they did not have lower levels of other nicotine withdrawal symptoms and were no more likely to succeed in quitting than heavier smokers.

Health effects and heritability

Korhonen, Broms, Levalähti, Koskenvuo, and Kaprio studied the heritability of intermittent smoking using data from a cohort study of Finnish adult twins. They found substantial heritability for the specific phenotype of intermittent smoking as distinct from regular smoking or never smoking. An et al. investigated whether very low levels of tobacco use in young adults produced symptoms in the short term. Using data from an Internet survey of college students, they found that smokers who smoked only 5 days/month had a higher occurrence of shortness of breath with regular activities compared with nonsmokers.

Future research for the road less traveled

The papers in this special issue represent a start, but the work is just beginning. Additional research areas ripe for exploration include the following:

- Develop consensus on acceptable definitions of light and intermittent smoking and determine how to measure light and intermittent smoking. A number of definitions are used in this special issue, and the existing variance calls for a clear rationale for various cutpoints.
- Conduct within-group analyses to better understand light or intermittent smokers.

- Reassess the applicability of the theories of smoking, addiction, quitting, and treatment modalities to light and intermittent smokers.
- Increase our understanding of the process of smoking and quitting among light and intermittent smokers.
- Coordinate global surveillance of consumption patterns to better understand the nuances of the tobacco pandemic.
- Reexamine eligibility criteria for smoking cessation trials. Adult cessation interventions tend to enroll individuals smoking more than 10 cigarettes/day, and eligibility criteria for trials of medications often have even higher minimum levels of daily cigarette consumption. These factors impede our ability to understand how effective medications are for light smokers and our ability to understand how to help these smokers quit smoking. Furthermore, many researchers have aired concerns about recruitment of minorities into trials, when in fact many minorities are not eligible because of their consumption level.
- Examine the usability and appeal of evidence-based practices among light and intermittent smokers. For example, quitlines are a major public health strategy for delivering cessation services. They aim to capture smokers who are motivated to quit smoking. However, the perception of risk among light and intermittent smokers may differ from that among heavier smokers, and this perception may affect their motivation to call a quitline.

Many other recommendations for future research are included in a separate report that researchers are encouraged to review, discuss, and implement (USDHHS, 2008).

Conclusions

This special issue of *Nicotine & Tobacco Research* on light and intermittent smoking creates optimism for a path that is groundbreaking, exciting, and meaningful. If our aim is to reduce the toll of tobacco among populations and to ensure the right of health to all, it is both responsible and ethical science to plan research agendas that aim to reduce light and intermittent smoking. The projections suggest an impending global pandemic of light and intermittent smoking, and it is important for researchers to monitor this as well as tackle it without delay. The road less traveled—entering a new era of research in which the full spectrum of smokers will be examined—will make the difference. Tobacco threatens the lives of 1 billion people in the 21st century, and multiple research efforts are needed to curb this pandemic. The road less traveled will move the field in a direction in which we are well prepared through global partnerships, discussions, and special initiatives to deal with the tobacco pandemic.

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