Adapting to a Changing Tobacco Landscape

Research Implications for Understanding and Reducing Youth Tobacco Use

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Patterns of youth tobacco use in the U.S. are becoming increasingly complex with the greater availability, marketing, and promotion of a diverse set of tobacco products. Using data from the 2012 National Youth Tobacco Survey (NYTS), the series of papers in this issue present a multifaceted examination of the attitudes and behaviors surrounding the diversity of tobacco products with a nationally representative sample of middle and high school students. Taken together, these papers represent one of the most comprehensive pictures of adolescent tobacco use in the U.S. and highlight both encouraging signs in reducing cigarette smoking and some early warning signs of potential new risks. The changing patterns of tobacco use attitudes and behaviors place a cautionary note on the progress made with adolescent tobacco use. As the recent Surgeon General's Report *The Health Consequences of Smoking—50 Years of Progress* concludes, the current rate of progress with tobacco control is not fast enough to reach the *Healthy People 2020* objective of reducing the prevalence of smoking among adults to 12%, and the actual number of youth starting to smoke has increased over the past decade.[1] The Surgeon General's Report and others[2] have emphasized that our foremost efforts need to remain strongly focused on reducing the toll from combustible tobacco products, the primary cause of tobacco-related morbidity and mortality. Thus, understanding how attitudes and behaviors surrounding various tobacco products influence reductions in total combustible tobacco use is of paramount importance.

We continue to make progress in reducing traditional markers of tobacco use among adolescents, primarily cigarettes, smokeless tobacco, and cigars.[3] However, these rates of decline may be deceptive. Traditional tracking of tobacco use, in which products are considered in isolation, may mask the extent of the tobacco problem. As the set of papers in this series has documented, tobacco use among adolescents is complicated by several phenomena. First, the use of nonconventional tobacco products, especially e-cigarettes and hookah, is on the rise.[4] Second, use of non-cigarette tobacco products may be under-reported without the use of clear descriptive and brand information on surveys, especially when tracking rates of use of cigars and little cigars.[5] Third, there is an escalating trend for dual and poly-tobacco product use.[4] How these changing patterns of use influence the development of nicotine dependence and adolescents' interest and difficulty in stopping tobacco use is not yet fully known. However, the potential for poly-product use to lead to increased dependence and difficulty in quitting smoking among traditional cigarette smokers is high.[6,7]

The use of nonconventional tobacco products presents additional concerns, since youth who use these products, notably e-cigarettes and hookah, compared to cigarette smokers, have lower rates of intentions to quit using tobacco.[7] We also do not yet have a clear understanding of how poly-product use may influence or be associated with intentions to quit. The data from the NYTS do not allow us to disentangle the question of whether adolescents use non-cigarette tobacco products as substitutes for cigarettes, supplements to cigarettes, or a potential means to reduce or quit cigarettes. Smoking cessation success, however, has been consistently linked to tobacco dependence, and the evidence is now strong that adolescents report symptoms of tobacco dependence even with low levels of use.[6] We still need to better understand how symptoms of dependence develop or change with the increasing use of non-cigarette tobacco products and poly-product use.

As this shifting landscape unfolds, we have the opportunity to get ahead of the phenomenon of changing tobacco use patterns and respond proactively with strong research, not only to help inform the policy decisions of the U.S. Food and Drug Administration's Center for Tobacco Products under the Family Smoking Prevention and Tobacco Control Act, but also to continue to provide evidence-based recommendations for timely prevention and treatment programs. Riley and colleagues[8] have called for a culture change in how research is conducted, emphasizing the need for "rapid, responsive, and relevant" research. The tobacco use environment presents a

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timely and fertile arena within which to apply these new, more flexible research recommendations and address some of the research implications from the groundwork laid by the papers in this series.

First is the need for accurate and time-sensitive surveillance with more descriptive measures and consideration of use patterning. Corey et al.[5] found that providing specific cigar brand examples was an important methodologic advance that likely led to increased reporting of cigar use. As products diversify, so too does the language of use, and our tracking measures need to be sensitive to colloquial descriptors of products among youth. For example, adolescents may make distinctions between e-cigarettes, "hookah pens," "vaporizers," and other "vape pens,"[9] and may not acknowledge use of more generic categories of products. Survey measures need to be well grounded in the descriptive language of target audiences in order to capture better the rates of use, and graphics may be an important addition to all surveys. Responsive and relevant wording requires ongoing qualitative work or environmental scans of key messaging sources, including the Internet and social media, among youth to capture these language subtleties. The challenge may be in harmonizing measures across surveys and over time.

Beyond terminology, we need to have measures that better reflect the patterns or behavioral phenotypes of use considering the multiple ways adolescents may use more than one product. The common measures of product use over the past 30 days are likely to be insufficient to examine in depth the development of dependence, substitution of one product for another, or their interplay. Understanding how, when, and in what sequence adolescents use multiple products may be critical for developing interventions to reduce use. For example, are little cigars used as a substitute for cigarettes because of availability or cost, or are they used for their own functional value (e.g., taste, look)? How does the patterning of hookah use vary from that of cigarettes? Is hookah, for example, used primarily as a weekend or social event, and are cigarettes, in contrast, used as the more solitary tobacco product? Does cigar use happen more with marijuana use, and does marijuana use influence choice of tobacco product as well? We need combined qualitative and quantitative research methods to answer these questions, as well as solid metrics for combining the frequency, intensity, and pattern (such as bursts of use) of product use over time.

Understanding the pattern of tobacco use behavior among adolescents, in terms of the totality of products used and the combined frequency and intensity, is needed to examine the links to tobacco dependence. Early symptoms of dependence are a signal for escalation to daily smoking,[10] and these symptoms show up early in use.[6] What we still need to know is how symptoms vary by tobacco product used and the combination of products, and whether the dependence measures commonly used in the field, developed in relation to cigarette smoking, are equally valid for non-cigarette tobacco product use. These questions should be of high priority given the foundational importance of tobacco dependence to intervention and policy.

With the changing tobacco landscape, we may also see a change in the characteristics of adolescents who use tobacco. As the prevalence of cigarette smoking has declined among adolescents, smoking has become more strongly associated with lower socioeconomic status, lower educational aspirations and attainment, geographic region, and comorbidities.[1] However, we do not yet know whether the well-established predictors of adolescent smoking will be equally valid predictors of use of non-cigarette tobacco products, or whether the newer tobacco products have a broader appeal. For example, is there a common core set of mechanisms, risks, and protective factors across tobacco products, or do these predictors vary by product or by single or poly-product use? Profiling of user characteristics is needed for developing effective, targeted intervention strategies.

Perceptions of tobacco harm have traditionally been important in protecting youth from smoking initiation and in promoting intentions to quit among those who smoke. To date, much of our knowledge about perceived harm of non-cigarette tobacco products has been framed in terms of risk compared to traditional cigarettes, rather than in terms of absolute risk.[11] Although adolescents perceive e-cigarettes to be less harmful than cigarettes,[11] how these relative harm perceptions influence rates of initiation or continuation of tobacco products is less well known. We need to move beyond simple comparisons of products to cigarettes, and also consider perceptions of tobacco products in absolute, not relative, terms. The lack of clarity about harm and confusing messaging about the spectrum of products and their relative harm have implications for warning labels and public health messaging. Current text-based warning labels do not appear to elicit high levels of cognitive involvement by adolescents,[12] and as such, may have limited effectiveness. Research is needed to examine whether graphic approaches can be more effective at persuasively and accurately conveying risks of non-cigarette tobacco products.

Longitudinal data will be crucial to addressing the question of how the behavioral patterning of the single and combined use of these different tobacco products

influences changes in prevalence and level of use of both combustible and other tobacco products. Cross-sequential design studies following adolescents at varying ages for several years may be most efficient to understand how adolescent development and transition to young adulthood may interact with risk and protective factors for changing tobacco use patterns. Given the time-sensitive nature of needing data to help inform policy decisions, we may not have the luxury of waiting many years for the results of traditionally designed longitudinal cohort studies with stable behavioral endpoints. We may need to identify early mediators of behavior change, particularly those that directly address the question of whether the new, emerging tobacco products, such as e-cigarettes or hookah, serve as gateways to increased susceptibility to conventional cigarettes or other forms of combustible tobacco products. Potential mediators may include curiosity about products,[13] intentions to use or to switch, positive responses to early trials, or even heightened awareness and exposure to all tobacco marketing.[14]

Intervention research may also need a new focus. We need to consider how the complexity of tobacco products influences our intervention strategies. For example, are interventions more effective when they broadly consider the array of all tobacco products, which rarely is done, or should our interventions continue to take a product-specific approach? Interventions may need refreshing to remain current, vibrant, and effective.

The tobacco research field has an unprecedented opportunity to have a major impact on policies that may accelerate progress with reducing the enormous toll from tobacco use. Yet traditional research funding cycles and mechanisms may not map onto the pressing policy needs and rapidly changing tobacco landscape. Alternative, quick turnaround research and funding opportunities are needed to keep our research relevant and maximize its impact. Finally, we need to remain objective and clear about presenting the results of research. Although few would argue with the goal of keeping youth tobacco-free, considering all forms of tobacco, we need to ensure that our results are communicated in clear, compelling, and honest ways that are accessible and understandable by the multiple stakeholder audiences. We need to ensure that strong science has the opportunity to weigh in on policy debates, and not to have passions alone sway the field.

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