Published in final edited form as:

Nicotine Tob Res. 2006 October ; 8(5): 683–687.

Adolescent definitions of change in smoking behavior: An investigation

Laura MacPherson, Ph.D.

Brown Medical School & Butler Hospital, Providence, RI

Mark G. Myers, Ph.D.

VA San Diego Healthcare System & University of California, San Diego

Malieka Johnson, B.A.

Veterans Medical Research Foundation, San Diego, CA.

Abstract

Although adolescent smoking cessation has received increased research attention, little information exists as to how adolescents define change efforts for smoking behaviors. This issue is of particular importance because surveys routinely incorporate items assessing smoking cessation, yet how adolescents interpret such items is unclear. The present study investigated definitions of smoking behavior change efforts among adolescents. A total of 94 adolescent smokers—of average age 16.7 years ($SD=1.0$), 56% female, and 71% White—were asked to define the terms *quit*, *stop*, and *cut down* smoking. Responses to the three questions were categorized using content analysis. Definitions of *quit* and *stop* were categorized as (a) stop permanently, (b) stop temporarily, (c) stop except in certain situations, and (d) reduce smoking (for *quit* only). Definitions of *cut down* were categorized as (a) reduce the number of cigarettes, (b) smoke less in a time frame, (c) reduce smoking occasions, and (d) smoke less. Three trained raters sorted responses into each of the categories. Definitions of *quit* and *stop* were most frequently categorized in the stop permanently category (86% and 75%, respectively). Definitions of *cut down* were distributed across categories, with 51% categorized as smoke less, 25% smoking less in a time frame, and 25% reducing number of cigarettes. Different definitions of *stop* were related to smoking history and motivation to quit, although the other two terms were not related to adolescent individual characteristics. Findings highlight the importance of using clearly defined questionnaire items when assessing adolescent smoking change efforts.

Introduction

Cigarette smoking among adolescents remains a major public health concern given the frequent persistence of this behavior into adulthood. However, despite increased study of adolescent smoking cessation efforts, basic methodological questions and issues in the characterization and measurement of the process of adolescent smoking cessation have not been addressed (Backinger et al., 2003; Mermelstein et al. 2002).

A notable concern is the lack of a consistently applied operational definition of what constitutes cessation. Among adults, the term *smoking cessation* refers to volitional efforts toward permanently stopping smoking behavior (Ockene et al., 2000). However, various definitions have been applied to adolescent smoking cessation, including self-labeled quitting (e.g., Dino et al., 2001) and being classified as “quit” if reporting no smoking within the past 30 days (e.g., Zhu, Sun, Billings, Choi, & Malarcher, 1999). Large-scale surveys also differ in how they

assess adolescent smoking cessation, ranging from specific queries about a “quit attempt” (Gilpin, Pierce, Berry, & White, 2003) to broadly phrased efforts to “stop” smoking (Johnston, Bachman, O’Malley, & Schulenberg, 2004).

Variability in operationalization of adolescent smoking cessation makes it difficult to compare cessation rates across studies (e.g., Backinger et al., 2003). It is also unknown whether use of terminology such as *quit* versus *stop* influences reporting of cessation efforts by adolescents, who themselves may exhibit inconsistencies in how they conceptualize change or respond to questions about cessation efforts (e.g., Backinger et al., 2003). Thus an important consideration in more accurately assessing attempts at smoking behavior change is to elucidate how adolescents define smoking change efforts and interpret smoking cessation terminology.

The objectives of the present study were to explore adolescent smokers’ definitions of terminology used in assessing cessation efforts and to propose developmentally appropriate wording for questions measuring adolescent cessation. We elicited open-ended responses regarding what it means to “quit,” “stop,” or “cut down” one’s cigarette smoking. Such information can influence wording of cessation items, and in turn potentially have an effect on item responses and reported prevalence rates. Finally, we investigated potential relationships between individual characteristics and interpretation of smoking behavior change terminology.

Method

Procedure

The present study used data from a sample of 94 adolescent smokers aged 14-18 years participating in a longitudinal study of smoking self-change. A total of 109 adolescents were recruited from three high schools in metropolitan San Diego. Criteria for subject inclusion were being 14-18 years of age and having smoked cigarettes in the prior 30 days. Informed consent (assent for minors under age 18) was obtained from parents and adolescent participants. Each participant received a US\$25 gift certificate for participating in the baseline interview from which the present data were obtained.

Measures

Prior to baseline administration, 94 adolescents completed a supplemental self-report questionnaire on definitions of changing smoking behavior. Three questions were posed in a free-response format with order of administration counterbalanced across participants: (a) What does it mean to quit smoking cigarettes (or how would you define “quit smoking”)? (*quit*) (b) What does it mean to stop smoking cigarettes (or how would you define “stop smoking”)? (*stop*) (c) What does it mean to cut down on smoking cigarettes (or how would you define “cut down”)? (*cut down*).

Teen Smoking Questionnaire (TSQ)—The TSQ is a structured interview that assesses lifetime smoking history (e.g., age at onset, past and current attempts at smoking cessation, and *DSM-IV* nicotine dependence criteria), current smoking (quantity and frequency), recent consequences from smoking, peer and family smoking behavior, and motivation to quit (Myers, Brown, & Kelly, 2000).

Modified Fagerström Tolerance Questionnaire (mFTQ)—Nicotine dependence was assessed using the seven-item mFTQ revised for adolescents (Prokhorov, Pallonen, Fava, Ding, & Niaura, 1996). Level of nicotine dependence was evaluated based on the following mFTQ cutoffs: 2 or less=no nicotine dependence; greater than 2 to 5 or less=moderate dependence; and greater than 5=substantial dependence (Prokhorov et al., 2001).

Results

Sample characteristics

Included participants were on average 16.7 years of age ($SD=1.0$; range=14.3-18.8); 56% ($n=53$) were females; and 71% were White, 9% Hispanic, 6% Asian American, and 14% of other ethnicities. The present sample consisted primarily of established, regular smokers with moderate symptoms of dependence. See Table 1 for sample smoking history.

Definitions of change

Youth in the present study generated a total of 282 responses. A classification system was developed for the three questions based on content analysis of the participant-generated responses, with consensus of three independent raters. Four categories were developed for *quit*: (a) stop permanently (to not smoke at any time in the future and to not smoke in any situations), (b) stop temporarily (to not smoke for a specified period of time), (c) stop except in certain situations (to not smoke in certain situations with no time period defined), and (d) reduce smoking (to smoke less than before without mention of stopping permanently). Content analysis of *stop* resulted in three categories comparable to the first three *quit* categories (stop permanently, stop temporarily, and stop except in certain situations). Four categories were developed for *cut down*: (a) reduce the number of cigarettes (cut down the number of cigarettes smoked by a specified amount), (b) smoke less in a time frame (smoke less often within a specified time period, such as week, month, or year), (c) reduce smoking occasions (restrict smoking in usual smoking situations), and (d) smoke less (smoke less without specifying quantity, frequency, or situations).

Written guidelines for category classification were used to create a response coding system based on the categories developed for the three definition questions. Three research assistants and one under-graduate student were trained to criterion on the coding system, which was used to resolve coding differences. Each response was coded independently by three raters. Average interrater reliabilities for the responses to *quit*, *stop*, and *cut down* were $\kappa=.86$, $\kappa=.80$, and $\kappa=.84$, respectively. Responses with inconsistent classifications were systematically reviewed and composited by the authors. Of the inconsistent classifications, 70% (30 responses) were resolved by the authors. The remaining 30% could not be rectified because of consensus that the responses did not fit in any categories or were iterative. See Table 2 for examples of category responses.

As shown in Table 2, 86% of adolescents' responses to *quit* were categorized as "stop permanently," with the remaining responses distributed across the three definition categories encompassing temporary changes in smoking behavior. A smaller percentage (~75%) of responses for *stop* were categorized as "stop permanently," and a sizable minority (~17%) was categorized as "stop temporarily." A little over 50% of responses to *cut down* were categorized as "smoke less," with most of the remaining responses distributed between "reduce the number of cigarettes" and "smoke less in a time frame."

Similarities in responses across definitions also were examined. Of those whose definition of *quit* was categorized as "stop permanently," 65% provided a response to *stop* that was categorized in the same way. About 17% of participants provided responses categorized as "stop temporarily" for both *quit* and *stop*. Notably, 12% of all *cut down* responses (63% of responses categorized as "reduce number of cigarettes") indicated that the amount is reduced by exactly half.

Comparisons across definition categories

Within each definition, categories were compared across demographics (gender, ethnicity, and age), smoking history variables (length of smoking history, nicotine dependence, and quit history), smoking among family and friends (parents' smoking status, friends' smoking intensity), and motivation to quit (intention to quit in the next 30 days and desire to quit). Because of small cell counts, definition categories were collapsed into "stop smoking permanently" vs. all other definitions for *quit* and *stop*, and "smoke less" vs. all others for *cut down*. None of the variables distinguished *quit* or *cut down* categories. Youth whose responses to *stop* were categorized as "stop smoking permanently" had a briefer smoking history, $F(1, 81)=4.19, p=.044$, and greater desire to quit smoking, $F(1, 82)=9.58, p=.003$, than all others.

Discussion

The present study examined adolescent smokers' conceptualizations of smoking behavior change terminology with the aim of recommending developmentally appropriate wording for questions assessing adolescent change efforts. Youth generated reliably categorized responses to open-ended questions eliciting their interpretation of the terms *quit*, *stop*, and *cut down*. The majority of participants generated responses to *quit* and to *stop* consistent with operationalization of adult smoking cessation. However, a sizeable minority interpreted these terms as a temporary change in smoking behavior. Our findings are consistent with results of a focus group study of adolescent smokers that indicated participants' prior efforts at changing smoking behavior were often intentionally temporary, despite being described by participants as attempts at *quitting* (Balch, 1998). The present study also identified within-respondent discrepancies in how *quit* and *stop* were defined, suggesting these terms may tap into qualitatively different goals of smoking behavior change for some youth.

A large minority of *cut down* responses were classified as a reduction in frequency or quantity. In the latter classification, the finding that a number of youth defined reductions to be specifically half of the quantity smoked was surprising given the innumerable ways reductions can be achieved. We suggest that intentionality be an important component of questions investigating smoking reduction efforts to distinguish among purposeful efforts at change and natural variability in smoking level related to less established patterns.

Analyses of individual characteristics indicated that adolescents whose responses were categorized as "stop permanently" had a stronger desire to quit. It may be that those who are more motivated to quit smoking permanently are more likely to interpret questions about changing behavior in line with a goal of permanent change. Youth with shorter smoking histories also were more likely to have definitions of *stop* characterized as "stop permanently," possibly because concept of change is more abstract for these youth (Mermelstein, 2003). We acknowledge such interpretations are made in the context of a substantial number of tests conducted, and thus findings require replication.

The present study has several limitations. Our sample was comprised primarily of established smokers, limiting generalizability of findings to adolescents with a broader range of smoking experience. Also, given that the sample was self-selected, the extent to which participants are representative of high school students who smoke is unknown, and caution should be taken in generalizing findings to other high school smokers. We also were unable to investigate in a fine-grained manner the role of other factors (e.g., cessation programming exposure) that may influence how youth interpreted cessation terminology. Future research should investigate how adolescent smokers interpret cessation terminology in more representative samples and through more refined qualitative methodology such as focus groups.

Keeping in mind these limitations, we offer the following recommendations for developmentally appropriate wording of items assessing adolescent smoking change efforts:

- To decrease ambiguity of questions investigating *permanent* behavior change efforts, items would benefit from the use of the word *quit* over *stop*, should not use these terms interchangeably, and should specify time frames for the behavior change in question.
- Questions should incorporate specifiers for intentionality of the behavior change (Mermelstein et al., 2002)—for example, whether the behavior change effort was intended to be permanent or temporary; and should investigate efforts toward permanent and temporary change separately.
- Questions tapping efforts at smoking reduction should clarify that a specific amount of change is not required to qualify as a change attempt, and should also include intentionality.

We also offer the following examples of adolescent smoking cessation process questions: (a) “Have you ever made a serious attempt to quit that lasted for at least 24 hours where you meant to quit smoking permanently?” (b) “Have you ever stopped smoking for at least 24 hours where you only planned to stop temporarily or for a limited period of time?” and (c) “Have you ever tried to cut down on how much you smoke, such as smoking less often or smoking fewer cigarettes than you normally do?” As the study of adolescent smoking cessation advances, utilization of item wording such as suggested herein can enhance our understanding of the self-change processes in this important developmental group.

Acknowledgments

This research was supported by Tobacco Related Disease Research Program grant 10IT-0280 and National Institute on Drug Abuse Independent Investigator Award K02-DA017652. We extend our appreciation to our research and undergraduate assistants.

References

- Backinger CL, McDonald P, Ossip-Klein DJ, Colby SM, Maule CO, Fagan P, Husten C, Colwell B. Improving the future of youth smoking cessation. *American Journal of Health Behavior* 2003;27(Suppl 2):S170–S184. [PubMed: 14521244]
- Balch GI. Exploring perceptions of smoking cessation among high school smokers: Input and feedback from focus groups. *Preventive Medicine* 1998;27:A55–A63. [PubMed: 9808818]
- Dino G, Horn K, Goldcamp J, Fernandes A, Kalsekar I, Massey C. A 2-year efficacy study of Not On Tobacco in Florida: An overview of program successes in changing teen smoking behavior. *Preventive Medicine* 2001;33:600–605. [PubMed: 11716656]
- Gilpin, EA.; Pierce, JP.; Berry, CC.; White, MM. Data collection methodology. 1. University of California at San Diego; La Jolla, CA: 2003. Technical report on analytic methods and approaches used in the 2003 California Tobacco Survey analysis..
- Johnston, LD.; Bachman, JG.; O’Malley, PM.; Schulenberg, JE. Monitoring the Future: A continuing study of American youth (12th grade survey), 2003. [Codebook for Form 1 data file.]. In: ICPSR, editor. Conducted by University of Michigan, Institute for Social Research, Survey Research Center. Interuniversity Consortium for Political and Social Research; Ann Arbor, MI: 2004.
- Mermelstein R. Teen smoking cessation. *Tobacco Control* 2003;12:i25–i34. [PubMed: 12773783]
- Mermelstein R, Colby SM, Patten C, Prokhorov A, Brown R, Myers M, Adelman W, Hudmon K, McDonal P. Methodological issues in measuring treatment outcome in adolescent smoking cessation studies. *Nicotine & Tobacco Research* 2002;4:395–403. [PubMed: 12521399]
- Myers MG, Brown SA, Kelly JF. A smoking intervention for substance abusing adolescents: Outcomes, predictors of cessation attempts, and post-treatment substance use. *Journal of Child and Adolescent Substance Abuse* 2000;9:77–81.

- Ockene JK, Emmons KM, Mermelstein RJ, Perkins KA, Bonollo DS, Voorhees CC, Hollis JF. Relapse and maintenance issues for smoking cessation. *Health Psychology* 2000;19(special issue):17–31. [PubMed: 10709945]
- Prokhorov AV, Hudmon KS, de Moor CA, Kelder SH, Conroy JL, Ordway N. Nicotine dependence, withdrawal symptoms, and adolescents' readiness to quit smoking. *Nicotine & Tobacco Research* 2001;3:151–155. [PubMed: 11403729]
- Prokhorov AV, Pallonen UE, Fava JL, Ding L, Niaura R. Measuring nicotine dependence among high-risk adolescent smokers. *Addictive Behaviors* 1996;21:117–127. [PubMed: 8729713]
- Zhu S, Sun J, Billings SC, Choi WS, Malarcher A. Predictors of smoking cessation in U.S. adolescents. *American Journal of Preventive Medicine* 1999;16:202–207. [PubMed: 10198659]

Table 1

Demographics and smoking characteristics.

Smoking history	Full sample
Length of smoking history in months, <i>M (SD)</i>	43.4 (22.9)
Regular smokers: Smoked 100 cigarettes in lifetime (per cent)	96
Level of nicotine dependence on mFTQ, <i>M (SD)</i>	3.3 (1.6)
Past 90-day smoking quantity-frequency, <i>M (SD)</i>	159.8 (175.8)
Daily smokers (% yes)	87
Lifetime quit attempts (% yes)	69
Quit attempts in past year (% yes)	62

Note. mFTQ, modified Fagerström Tolerance Questionnaire.

Table 2

Adolescents' definitions of smoking change efforts by category: Examples and percentage of responses.

Definition category	Examples	Percentage
Quit smoking		
Stop permanently	"To completely stop and never smoke again."	85.6
Stop temporarily	"To stop smoking for the time being."	6.7
Stop except in certain situations	"Not smoking at all; maybe smoke if stressed out."	4.4
Reduce smoking	"Smoking less than you normally do."	3.3
Stop smoking		
Stop permanently	"Completely stop/never smoke again."	74.7
Stop temporarily	"Stopping for the moment and possibly starting again."	16.9
Stop except in certain situations	"Almost quitting; most of the time don't smoke but sometimes you do."	8.4
Cut down smoking		
Reduce the number of cigarettes	"Smoking 50% less; cutting down by half or more."	21.7
Smoke less in a time frame	"Lowering the amount of cigs you smoke, daily or weekly."	25.0
Reduce smoking occasions	"Just smoking on the weekends or avoiding situations and places."	2.2
Smoke less	"To smoke less than you did before."	51.1