Published in final edited form as:

Rehabil Psychol. 2013 May ; 58(2): 117–123. doi:10.1037/a0031577.

Methods Used to Quit Smoking by People with Physical Disabilities

Belinda Borrelli, Ph.D.,

Warren Alpert School of Medicine of Brown University and The Miriam Hospital, Centers for Behavioral & Preventive Medicine, & Program in Nicotine and Tobacco Research

Andrew M. Busch, Ph.D., and

Centers for Behavioral & Preventive Medicine & The Program in Nicotine & Tobacco, Warren Alpert School of Medicine of Brown University and The Miriam Hospital.

David RM Trotter, PhD.

The Department of Family Medicine and Community Health, University of Massachusetts Medical School

Abstract

Purpose/Objective—People with mobility impairments (MIs) have higher smoking rates than the general population. We evaluated the use of psychosocial and pharmacological methods to quit smoking and readiness to quit smoking in this population in a cross-sectional study.

Research Method/Design—Current and former smokers with MIs who needed equipment to ambulate (e.g. cane, wheelchair; N=152, 53.3% female, 86.2% current smokers) were recruited from the community and interviewed by telephone regarding their lifetime use of various quit methods and readiness to quit smoking.

Results—Results indicated that 57.3% reported a quit attempt in the past year, and 62% and 88.4% were planning on quitting in the next 30 days and six months, respectively. A minority of smokers with MIs reported using any type of counseling (5.3%; 3.3% in person counseling and 2.6% phone counseling) or tablet medication (8.6%); 75% had made a “cold turkey” quit attempt (e.g., without any assistance). 36.8% and 19.7% reported using the nicotine patch and gum respectively. Regression analyses indicated that greater nicotine dependence was associated with lower use of psychosocial treatments ($p<.05$), greater education was associated with greater tablet medication use ($p=.051$), and higher income was associated with both greater nicotine replacement therapy (NRT) and tablet medication use ($p<.05$). Minorities with MIs were significantly less likely to use NRT than non-Hispanic whites ($p<.05$).

Conclusions—Individuals with MIs are motivated to quit smoking but under-utilize some empirically validated cessation treatment options.

Keywords

Smoking; physical disabilities; nicotine replacement; stop smoking medication; smoking cessation; motivation; quitline

1. Introduction

Smoking prevalence among adults with disabilities is higher (28-40%) (Altman & Bernstein, 2008), than that of the general U.S. population (19.3%) (Center for Disease Control 2011). People with physical disabilities smoke more cigarettes per day and are more nicotine dependent than those without physical disabilities (Brawarsky, Brooks, Wilber, Gertz, & Klein Walker, 2002; Jones & Bell, 2004). The disparity in smoking prevalence between people with and without disabilities is greatest among the poor (36.7% of poor people with disabilities smoke vs. 22.6% of poor people without disabilities) (Armour, et al., 2004), young women (43.3% of those with physical disabilities smoke versus 25.1% without physical disabilities) (Chevarley, Thierry, Gill, Ryerson, & Nosek, 2006), and people with more severe vs. less severe functional impairment (Jones & Bell, 2004). Smoking rates are higher among those who need an assistant to handle routine needs or personal care (32.5%) versus those who do not (23.0%) (Brawarsky, et al., 2002).

Smokers with physical disabilities are at risk for the same smoking related health problems as the general population, but in addition, they are also at risk for exacerbation of their existing disability and underlying medical condition. Smokers with a relapsing-remitting multiple sclerosis (MS) are three times more likely to develop a secondary-progressive disease course (Hernan, et al., 2005). People with physical disabilities experience an average of 14 secondary conditions per year (Nosek, et al., 2006) including increased respiratory difficulties and infections, symptom exacerbation, immunomodulatory effects, increased pain and fatigue, stomach ulcers, burns, muscle weakness, delayed healing of pressure sores, reduced pulmonary and circulatory functioning, and depression and anxiety (Almenoff, Spungen, Lesser, & Bauman, 1995; Linn, et al., 2003; Wilber, et al., 2002). Those who smoke are more likely to experience at least one secondary condition, and have a greater number of secondary conditions (Nosek, et al., 2006). There is overwhelming evidence that smoking cessation improves health outcomes for people with physical disabilities (Mitra, Chung, Wilber, & Klein Walker, 2004; U.S. Public Health Service - Office of the Surgeon General, 1990; Wu & Sin, 2011).

The methods used to quit smoking by people with physical disabilities may differ from those used by the general population because of transportation challenges, architectural access barriers, pain, fatigue, low income, and concerns about taking additional medication. To our knowledge, no studies have assessed methods to quit smoking used by people with MIs.

The primary aim of this paper is to describe the methods to quit smoking used by a community based sample of individuals with MIs, defined as those who regularly use equipment to ambulate (e.g., prosthetic leg, wheel chair, leg braces, cane, walker, etc.). We hypothesized that people with MIs would favor smoking cessation services that do not require face-to-face meetings or prescription medication, given our previous qualitative data indicating that people with MIs often have transportation difficulties and worry about medication side effects and drug-drug interactions (Borrelli, Hayes, & Park 2010). Additionally, we explore predictors of use of various psychosocial and pharmacologic interventions for smoking cessation.

A second aim of the current paper is to examine readiness to quit smoking among people with MIs. We hypothesized that our sample would have high levels of readiness to quit. This is based on prior research which shows high levels of motivation to quit among smokers with spinal cord injuries (Weaver & LaVela, 2007) and among smokers with MS (Friend, Mernoff, Block, & Reeve, 2006). Our study is the first to examine readiness to quit smoking among a sample of smokers who need assistive equipment to ambulate and who have a variety of diseases and injuries underlying their impairment.

Data on readiness to quit smoking and methods used to quit smoking has important clinical and treatment development implications, as it highlights which smoking cessation services are most likely to be accessed and used by individuals with MIs.

2. Material and Methods

2.1 Participants

Participants were 152 individuals with chronic MIs (Table 1) recruited in Rhode Island and Massachusetts to participate in a study regarding their opinions about smoking cessation programs for people with physical disabilities. Recruitment materials indicated that they did not have to want to quit smoking to participate. Inclusion criteria were 1) regular use of equipment to ambulate (e.g., prosthetic leg, wheel chair, leg braces, cane, walker, etc.) for at least the past year and with the expectation to continue to use this equipment on an ongoing basis, 2) over 18 years of age, 3) smoked 100 cigarettes in their lifetime, 4) either currently smoking 3 cigarettes per day or a former smoker who has quit within the past 2 years, 5) ability to speak and understand English. Exclusions were 1) visual or hearing impairment, 2) current pregnancy, 3) consumption of > 14 alcoholic drinks per week, 4) major cognitive deficit (scores <26, as assessed by the Telephone Interview for Cognitive Status; Brandt, Spencer, & Folstein, 1988), 5) serious mental illness indicated by either failing a brief screen adapted from the SCID I and (First, Spitzer, Gibbon, & Williams, 2002) or self-report and 6) obesity as the only cause of their MI. Participants were recruited from through flyers posted in the community (e.g. bus ads, posters at local hospitals and rehabilitation centers) and newsletters and postcards sent out by independent living agencies and other community agencies (e.g. Rhode Island Dept. of Health, Ocean State Center for Independent Living). The study was approved by our institution's human subjects review board.

Seven people used their devices on a temporary basis (due to injury) and were excluded. Of those who met screening criteria for smoking and for mobility impairments, 21 were not eligible for the following reasons: 1 was not fluent in English, 4 exceeded the alcohol cut-off, 12 had cognitive impairments that were too severe, and 4 were excluded due to serious mental illness. Of the 152 participants in the final sample, 131 were current smokers and 21 were smokers who quit within last two years.

2.2 Measures and Procedure

All measures were administered over the telephone by trained research assistants. We assessed demographics (e.g., age, ethnicity, education, and income) and type of equipment used to ambulate. Only current smokers were asked about the number of cigarettes smoked per day, smoking within 30 minutes of waking (yes/no), quit attempts in the last year (>24 hours in duration; yes/no), their readiness to quit smoking (plans to quit in the next 30 days (yes/no), and their plans to quit in the next 6 months (yes/no; Table 2). Both current and former smokers were asked to report any psychosocial or pharmacological quit methods they had ever used to quit smoking from a checklist of methods that included the items listed in Table 3. Participants were permitted to indicate the use of more than one method of quitting.

3. Statistical Methods

Descriptive statistics and proportion are used to report readiness to quit, quit attempts, and lifetime use of the various methods to quit smoking. We used multivariate logistic regression to explore the demographic and smoking characteristics that correlate with lifetime use of quit methods. Specifically, we conducted three logistic regressions predicting use of any Nicotine Replacement Therapy (NRT), tablet medication such as Bupropion

(Zyban) or Varenicline (Chantix), and any psychosocial treatment. Each model included age, gender, minority status (non-Hispanic white vs. other), education (a high school education vs. > a high school education), and nicotine dependence (first cigarette within 30 mins. of awakening vs. first cigarette >30 minutes of awakening). We also provide data from previous studies that report readiness to quit smoking, quit attempts (>24 hour) (Centers for Disease Control & Prevention, 2011; Curry, Sporer, Pugach, Campbell, & Emery, 2007; Gibson, et al., 2010; Hughes, Marcy, & Naud, 2009; McClave, et al., 2010; University of Wisconsin Center for Tobacco Research and Intervention, UW Comprehensive Cancer, Center's Monitoring, & Evaluation Program Wisconsin Tobacco Control Board, 2003), and lifetime use of methods to quit (DiClemente, Delahanty, & Fiedler, 2010; Hughes, et al., 2009; Ryan, Garrett-Mayer, Alberg, Cartmell, & Carpenter, 2011; University of Wisconsin Center for Tobacco Research and Intervention, et al., 2003; Vallone, Duke, Cullen, McCausland, & Allen, 2011) among smokers from the general population. Reports on smokers from the general population are included only to provide context for our results.

4. Results

4.1 Readiness to Quit and Previous Quit Attempts

More than half of our sample reported that they were planning to quit smoking in the next 30 days (62.0%), and a large majority reported that they were considering quitting sometime within the next 6 months (88.4%). More than half of our sample reported a 24 hour quit attempt in the last year (57.3%; Table 2).

4.2 Use of Quit Methods

Table 3 displays the rates of lifetime use of various quit methods. Our sample had very low rates of using individual counseling, group counseling, cessation clinic counseling, and phone counseling (1.3%, .7%, 1.3% and 2.6%, respectively) and high rates of unassisted quitting ("cold turkey" 75%). Only 5.3% of participants reported ever use of any psychosocial treatment (i.e., individual counseling, group counseling, cessation clinic, or phone counseling). On the other hand, a high percentage of smokers reported ever use of NRT (46.1%), and any pharmacological aid (i.e., any NRT or any tablet medication, 48.0%). Reported use of tablet medication was low (8.6%).

Participants were significantly more likely to have used the nicotine patch (36.8%; 56/152) than the nicotine gum (19.7% 30/152; McNemar test, $p < .001$), and were more likely to have used any NRT (46.1%, 70/152) than any tablet medication for smoking cessation (8.6%, 13/152; McNemar test, $p < .001$).

4.3 Correlates of the Use of Different Quit Methods by Mobility Impaired Smokers

We assessed the correlates of lifetime use of the different quit methods (NRT, tablet medication, or any psychosocial treatment) among current smokers in our sample ($n=131$). We assessed demographics (age, gender, income, education, and minority status) and nicotine dependence (smoking within 30 minutes of waking) as correlates. Nicotine dependence, education, minority status and income all emerged as significant correlates of the use of particular quit methods. Specifically, smoking within 30 minutes of waking was associated with lower utilization of psychosocial methods to quit smoking, while controlling for demographics ($p < .05$, Wald = 3.88, Odds Ratio = .16, 95% CI .03-.99). Among those who smoked 30 minutes after waking, 2.1% reported using psychosocial methods to quit smoking vs. 11.4% among those who smoked > 30 minutes after waking. Minority status was significantly associated with a lower lifetime use of NRT, while controlling for other demographics and nicotine dependence ($p < .05$, Wald = 3.88, Odds Ratio = .46, 95% CI .21

– 1.00); 33.3% of minority participants reported ever use of NRT vs. 48.8% of non-Hispanic white participants.

Having greater than high school education was marginally associated with greater use of tablet medication ($p < .051$, Wald = 3.81, Odds ratio 3.35, 95% CI .995-11.25), while controlling for other demographics and nicotine dependence. Six percent of those with a high school education had used tablet medication vs. 17.0% among those with > a high school education.

Fourteen participants who were currently smoking refused to report household income, so income was not entered into the above multivariate regressions. Among current smokers reporting household income ($n = 117$), 35.4% of those earning \$10,000 had used NRT vs. 53.8% among those earning > \$10,000 ($\chi^2 = 4.00$, $p < .05$). In terms of using tablet medication to quit smoking, 4.6% of those earning \$10,000 had used tablet medication vs. 17.3% among those earning > \$10,000 (Fisher exact test $p < .05$). Income was not significantly associated with use of psychosocial methods to quit smoking.

5. Discussion

Despite the high prevalence of smoking, few studies examine smoking behavior among people with MIs. The current study is the first to examine readiness to quit smoking and methods used to quit smoking among smokers with MIs. It is surprising that this population has not yet been targeted for study, given their high smoking rates, and the effect of smoking not only on their primary disabilities, but also on the development of secondary conditions. Our paper reports three main findings: 1) smokers with MIs had high rates of quit attempts in the last year and high intentions to quit smoking, 2) smokers with MIs had low usage of psychosocial treatments and tablet medications, and a high usage of unassisted “cold turkey” methods; and 3) There were significant correlates of type of method used to quit smoking: greater nicotine dependence was associated with lower use of psychosocial treatments, having a high school education or less was associated with lower use of tablet medication ($p = .051$), minorities were less likely to use NRT, and having lower income was associated with less use of both NRT and tablet medication.

It is widely assumed that smokers with physical disabilities are not motivated to quit; that they have multiple daily stressors already and that smoking makes their lives more tolerable (Iezzoni, McCarthy, Davis, & Siebens, 2000). However, we found that smokers with MIs reported high rates of intentions to quit smoking and more than half of our sample reported past year 24-hour quit attempts. Future studies should include smokers from the general population, without MIs, to determine whether these variables differ between the two groups. Though not directly comparable, we report the results from previous studies of smokers from the general population in Table 2, in order to provide context. While no firm conclusions can be made, Table 2 provides some preliminary insights that readiness to quit smoking may be higher among those with MI. Even without this comparison, our finding that smokers with MIs have high motivation to quit is encouraging.

However, high smoking rates, in the context of high motivation to quit smoking, suggests that smokers with physical disabilities may face systematic barriers to smoking cessation treatment (Borrelli, 2010; Table 2). Indeed, in our sample, we found a very low rate of use of psychosocial treatments for smoking cessation and high rates of unassisted quitting. People with physical disabilities have less access to preventive and health maintenance resources due to economic and mobility restrictions (Gerben, 1997; Robinson-Whelen, et al., 2006; U.S. Department of Health and Human Services, 2000). Specifically, there are geographic constraints (distance in rural areas or weather), architectural or transportation barriers, pain, fatigue, weakness, lack of personal assistance, and lack of childcare (Hughes,

Nosek, Howland, Groff, & Mullen, 2003; Seekins, et al., 1999). Procedures of daily care and energy fluctuations may also preclude treatment engagement and attendance (Becker & Stuijbergen, 2004; Stuijbergen, 1990). Smokers with MIs are also less likely to receive smoking cessation counseling from their health care practitioners (Iezzoni et al., 2000).

Though it may seem that the use of quitline counseling might resolve barriers to treatment access, only 2.6% of our sample reported using telephone counseling, which is substantially less than the 12% rate of use among general smokers (Hughes, et al., 2009). Promotion of quitline use in people with MIs may be worthwhile. Internet, social media, and other home-based interventions may also prove to be more accessible forms to reach and treat smokers with MIs, as they are low cost and can be shared with others who can aid them in the quit attempt.

Within sample comparisons indicated that smokers with mobility impairments were significantly more likely to use the nicotine patch than the nicotine gum, and were six times more likely to use “Any NRT” vs. “tablet medication” to stop smoking. Our sample generally used tablet medication less than comparison general population samples. Emphasizing the safety of NRT and tablet medication may help to facilitate the use of pharmacotherapy in this people with MIs.

We also assessed the demographic and smoking behavior correlates of using psychosocial treatments, NRT and tablet medication. Those who smoked within 30 minutes of waking were less likely to use psychosocial treatments; those who had a high school education or less were less likely to use tablet medication; minorities were less likely to use NRT; and those with lower incomes were less likely to use either NRT or tablet medication. Shiffman and colleagues (Shiffman, Brockwell, Pillitteri, & Gitchell, 2008) also found that higher education and income were independent correlates of greater use of pharmacological treatment among smokers in the general population. In contrast to our results, Shiffman et al (2008) found that those who smoked within 30 minutes of waking were *more likely* to engage in psychosocial treatment. The difference between their results and ours may be that, in our sample, those with higher levels of dependence are more likely to have more severe MIs, and they may experience more barriers to psychosocial treatment (Brawarsky, et al., 2002). Our finding that minority smokers with MIs were less likely to use NRT than non-Hispanic white smokers is consistent with findings among minority smokers without MIs (Fu, et al., 2008; Hughes, Robinson-Whelen, Taylor, & Hall, 2006).

Criteria to assess whether or not a particular subgroup of smokers falls into the “underserved category” have been developed (Borrelli, 2010), and smokers with physical disabilities meet all four of the criteria, as they have: 1) > 10% higher smoking prevalence than the general population, 2) disproportionate tobacco-related health disparities, 3) lack of access to effective treatments and barriers to treatment, and 4) less inclusion in prospective, longitudinal treatment trials.

It is not clear that evidenced-based treatments (EBTs) that are efficacious for the general population will be sufficient to help people with MIs to quit smoking. In order to prevent unnecessary proliferation of treatments while still attending to the most at-risk groups, Borrelli (2010) outlined eight criteria to justify the need for cultural adaptation for evidenced based treatments. A particular population may not respond to an EBT for smoking cessation if there are differences from the general population in 1). rates and patterns of smoking, 2). burden of tobacco-related health diseases, 3). predictors of smoking behavior, 4). risk factors for smoking, 5). protective factors that may aid quitting, 6). treatment engagement (e.g., participation, attrition, adherence), 7). treatment response, or 8). perceived social validity of the EBT (e.g., degree to which the target members view EBT strategies as relevant, helpful

and acceptable). Smokers with MIs meet all of these eight criteria (Borrelli 2010, Table 2). For example, in terms of risk factors for smoking, rates of depression among people with physical disabilities range from 31% to 51% vs. 4% of the general population (Chevarley, et al., 2006), and depressed smokers are less likely to quit (Berlin & Covey, 2006) and more likely to relapse (Niaura, et al., 2001). Other risk factors for treatment failure among people with MIs are multiple medical comorbidities, high levels of stress, lack of physical activity, boredom, high unemployment, and low income (Dejong, et al., 2002; Hughes, et al., 2006).

While it is recognized that cultural tailoring of existing EBTs for a variety of underserved subpopulations may be inefficient and expensive, dissemination of EBTs without regard for cultural factors could lead to lower treatment participation, failed change attempts, and disengagement from future change attempts. The results from our current paper and previous findings with African-American smokers and Latino smokers support the notion that “one size fits all” approaches to treatment may not be effective with different subgroups (Fu, et al., 2008; Ryan, et al., 2011; Zinser, Pampel, & Flores, 2011). Smoking cessation treatments that directly target mobility impaired smokers are currently under development (NCI R01 CA137616 to B. Borrelli). In the meantime, practitioners should recommend a combination of treatment modalities (pharmacotherapy plus behavioral treatment such as internet or quit line) for smokers with MIs to ensure the best chance of success with smoking cessation.

Our study has several limitations. The data were based on retrospective self-reports. Also, we did not collect data on the extent of treatment use (e.g., NRT duration, number of treatment sessions attended). Caution must also be used when comparing our results to the results obtained with general population studies. We provided these data merely to provide context for the present results and direction for future studies. Finally, because our sample size was small, it may not be representative of the larger population of smokers with mobility impairments. Our exclusion criteria also limits the generalizability of the sample (e.g., heavy drinking, serious mental illness), though only a small proportion of people were excluded. However, this is a first step to describe smoking and quitting behaviors in this population.

The strengths of our study outweigh the limitations because of the dearth of research in the area and because smoking prevalence does not appear to be decreasing in this population, as it is in the general population (Center for Disease Control 2011). In addition, smokers with MIs are more at risk for smoking-related diseases and the development of secondary conditions, which have great cost at both an individual level and a societal, economic level. Evidenced-based treatments for smoking cessation are greatly underutilized by the general population of smokers (Shiffman, et al., 2008) and our study demonstrates that this problem is more pronounced among people with MIs.

Acknowledgments

This research was supported by grant from the National Cancer Institute to B. Borrelli [R01 CA137616-01](#)

References

- Almenoff PL, Spungen AM, Lesser M, Bauman WA. Pulmonary function survey in spinal cord injury: Influences of smoking and level and completeness of injury. *Lung*. 1995; 173:297–306. [PubMed: 7564488]
- Altman, B.; Bernstein, A. Disability and health in the United States, 2001–2005. Hyattsville, MD: National Center for Health Statistics; 2008.
- Armour B, Campbell V, JE C, Malarcher A, Maurice E, Richard R. State-level prevalence of cigarette smoking and treatment advice, by disability status, United States. *Prevention of Chronic Diseases*. 2004; 4:A86.

- Becker H, Stuifbergen A. What makes it so hard? Barriers to health promotion experienced by people with multiple sclerosis and polio. *Family and Community Health*. 2004; 27:75–85. [PubMed: 14724504]
- Berlin I, Covey LS. Pre-cessation depressive mood predicts failure to quit smoking: The role of coping and personality traits. *Addiction*. 2006; 101:1814–1821. [PubMed: 17156181]
- Borrelli B. Smoking cessation: Next steps for special populations research and innovative treatments. *Journal of Consulting and Clinical Psychology*. 2010; 78:1–12. [PubMed: 20099945]
- Borrelli B, Hayes R, Park E. Barriers and facilitators to quitting smoking among people with mobility impairments: A qualitative study. 2010 Unpublished data, manuscript in preparation.
- Brandt J, Spencer M, Folstein M. The Telephone Interview for Cognitive Status. *Neuropsychiatry Neuropsychol Behav Neurol*. 1988; 1:111–117.
- Brawarsky P, Brooks DR, Wilber N, Gertz RE Jr, Klein Walker D. Tobacco use among adults with disabilities in Massachusetts. *Tobacco Control*. 2002; 11(Suppl 2):ii29–33. [PubMed: 12034978]
- Center for Disease Control. Current cigarette smoking prevalence among working adults - United States, 2004–2010. *Morbidity and Mortality Weekly Report*. 2011; 60:1305–1309. [PubMed: 21956406]
- Centers for Disease Control & Prevention. Quitting smoking among adults -United States, 2001–2010. *Morbidity and Mortality Weekly Report*. 2011; 60:1513–1519. [PubMed: 22071589]
- Chevarley FM, Thierry JM, Gill CJ, Ryerson AB, Nosek MA. Health, preventive health care, and health care access among women with disabilities in the 1994–1995 National Health Interview Survey, Supplement on Disability. *Womens Health Issues*. 2006; 16:297–312. [PubMed: 17188213]
- Curry SJ, Sporer AK, Pugach O, Campbell RT, Emery S. Use of tobacco cessation treatments among young adult smokers: 2005 National Health Interview Survey. *American Journal of Public Health*. 2007; 97:1464–1469. [PubMed: 17600243]
- Dejong G, Palsbo SE, Beatty PW, Jones GC, Knoll T, Neri MT. The organization and financing of health services for persons with disabilities. *Milbank Quarterly*. 2002; 80:261–301. [PubMed: 12101873]
- DiClemente CC, Delahanty JC, Fiedler RM. The journey to the end of smoking: A personal and population perspective. *American Journal of Preventive Medicine*. 2010; 38:S418–428. [PubMed: 20176317]
- First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition With Psychotic Screen (SCID-I/P W/ PSY SCREEN). New York: Biometrics Research, New York State Psychiatric Institute; 2002.
- Friend KB, Mernoff ST, Block P, Reeve G. Smoking rates and smoking cessation among individuals with multiple sclerosis. *Disability and Rehabilitation*. 2006; 28:1135–1141. [PubMed: 16966234]
- Fu SS, Kodl MM, Joseph AM, Hatsukami DK, Johnson EO, Breslau N, Wu B, Bierut L. Racial/Ethnic disparities in the use of nicotine replacement therapy and quit ratios in lifetime smokers ages 25 to 44 years. *Cancer Epidemiology, Biomarkers and Prevention*. 2008; 17:1640–1647.
- Gerben D. Primary care for persons with disabilities supplement: Introduction. An overview problem. *American Journal of Physical Medicine and Rehabilitation*. 1997; 76:2–3. [PubMed: 9036904]
- Gibson JE, Murray RL, Borland R, Cummings KM, Fong GT, Hammond D, McNeill A. The impact of the United Kingdom's national smoking cessation strategy on quit attempts and use of cessation services: Findings from the International Tobacco Control Four Country Survey. *Nicotine & Tobacco Research*. 2010; 12(Suppl):S64–71. [PubMed: 20889483]
- Hernan MA, Jick SS, Logroscino G, Olek MJ, Ascherio A, Jick H. Cigarette smoking and the progression of multiple sclerosis. *Brain*. 2005; 128:1461–1465. [PubMed: 15758034]
- Hughes JR, Marcy TW, Naud S. Interest in treatments to stop smoking. *Journal of Substance Abuse Treatment*. 2009; 36:18–24. [PubMed: 18550319]
- Hughes R, Nosek M, Howland C, Groff J, Mullen P. Health promotion for women with physical disabilities: A pilot study. *Rehabilitation Psychology*. 2003; 48:182–188.
- Hughes RB, Robinson-Whelen S, Taylor HB, Hall JW. Stress self-management: An intervention for women with physical disabilities. *Womens Health Issues*. 2006; 16:389–399. [PubMed: 17188222]

- Iezzoni LI, McCarthy EP, Davis RB, Siebens H. Mobility impairments and use of screening and preventive services. *American Journal of Public Health*. 2000; 90:955–961. [PubMed: 10846515]
- Jones GC, Bell K. Adverse health behaviors and chronic conditions in working-age women with disabilities. *Family and Community Health*. 2004; 27:22–36. [PubMed: 14724500]
- Linn WS, Spungen AM, Gong H Jr, Bauman WA, Adkins RH, Waters RL. Smoking and obstructive lung dysfunction in persons with chronic spinal cord injury. *Journal of Spinal Cord Medicine*. 2003; 26:28–35. [PubMed: 12830966]
- McClave AK, Whitney N, Thorne SL, Mariolis P, Dube SR, Engstrom M. Adult tobacco survey - 19 States, 2003–2007. *MMWR. Surveillance Summaries*. 2010; 59:1–75.
- Mitra M, Chung MC, Wilber N, Klein Walker D. Smoking status and quality of life: a longitudinal study among adults with disabilities. *American Journal of Preventive Medicine*. 2004; 27:258–260. [PubMed: 15450640]
- Niaura R, Britt DM, Shadel WG, Goldstein M, Abrams D, Brown R. Symptoms of depression and survival experience among three samples of smokers trying to quit. *Psychology of Addictive Behaviors*. 2001; 15:13–17.
- Nosek MA, Hughes RB, Petersen NJ, Taylor HB, Robinson-Whelen S, Byrne M, Morgan R. Secondary conditions in a community-based sample of women with physical disabilities over a 1-year period. *Archives of Physical Medicine and Rehabilitation*. 2006; 87:320–327. [PubMed: 16500164]
- Robinson-Whelen S, Hughes RB, Taylor HB, Colvard M, Mastel-Smith B, Nosek MA. Improving the health and health behaviors of women aging with physical disabilities: A peer-led health promotion program. *Womens Health Issues*. 2006; 16:334–345. [PubMed: 17188216]
- Ryan KK, Garrett-Mayer E, Alberg AJ, Cartmell KB, Carpenter MJ. Predictors of cessation pharmacotherapy use among black and non-Hispanic white smokers. *Nicotine & Tobacco Research*. 2011; 13:646–652. [PubMed: 21464200]
- Seekins, T.; White, G.; Ravesloot, C.; Norris, K.; Szalda-Petree, A.; Lopez, J. Developing and evaluating community-based health promotion programs for people with disabilities. In: Simeonsson, RJ.; McDevitt, LN., editors. *Issues in disability and health: The role of secondary conditions and quality of life*. Chapel Hill, NC: University of North Carolina at Chapel Hill; 1999. p. 221–238.
- Shiffman S, Brockwell SE, Pillitteri JL, Gitchell JG. Use of smoking-cessation treatments in the United States. *American Journal of Preventive Medicine*. 2008; 34:102–111. [PubMed: 18201639]
- Stuifbergen AK. Patterns of functioning in families with a chronically ill parent: An exploratory study. *Research in Nursing and Health*. 1990; 13:35–44. [PubMed: 2305108]
- U.S. Department of Health and Human Services. *Healthy people 2010: Understanding and improving health*. 2. Washington, DC: U.S. Government Printing Office; 2000.
- U.S. Public Health Service - Office of the Surgeon General. *The health benefits of smoking cessation: A report of the Surgeon General*. DHHS Publication No 90-8416. 1990
- University of Wisconsin Center for Tobacco Research and Intervention, UW Comprehensive Cancer, Center's Monitoring, & Evaluation Program Wisconsin Tobacco Control Board. *How smokers are quitting*. Action paper number 3. 2003
- Vallone DM, Duke JC, Cullen J, McCausland KL, Allen JA. Evaluation of EX: A national mass media smoking cessation campaign. *American Journal of Public Health*. 2011; 101:302–309. [PubMed: 21164094]
- Weaver FM, LaVela SL. Preventive care in spinal cord injuries and disorders: Examples of research and implementation. *Physical Medicine and Rehabilitation Clinics of North America*. 2007; 18:297–316. vii. [PubMed: 17543774]
- Wilber N, Mitra M, Walker DK, Allen D, Meyers AR, Tupper P. Disability as a public health issue: Findings and reflections from the Massachusetts survey of secondary conditions. *Milbank Quarterly*. 2002; 80:393–421. [PubMed: 12101878]
- Wu J, Sin DD. Improved patient outcome with smoking cessation: When is it too late? *International Journal of Chronic Obstructive Pulmonary Disease*. 2011; 6:259–267. [PubMed: 21814462]

Zinser MC, Pampel FC, Flores E. Distinct beliefs, attitudes, and experiences of Latino smokers: relevance for cessation interventions. *American Journal of Health Promotion*. 2011; 25:eS1–15. [PubMed: 21510796]

Impact

- The prevalence of smoking is higher among people with disabilities vs. those without disabilities. No studies have investigated the degree to which smokers with MIs are motivated to quit smoking, nor have they investigated the methods used to quit smoking by smokers with MIs. Our study is the first to investigate these questions among people with MIs in order to determine the degree of usage of evidence-based treatments for smoking cessation.
- Though it is widely assumed that smokers with MIs have low motivation to quit smoking (resulting in less practitioner advice to quit), we found that smokers with MIs are motivated to quit smoking and a high proportion are attempting to quit smoking. Practitioners should support motivation to quit and quit attempts by recommending evidenced based treatments for smoking cessation. This is especially important in light of our finding that people with MIs tend to not use evidenced based treatments for smoking cessation; rather they have high rates of unassisted quitting and low use of psychosocial treatments.
- Smokers with MIs were less likely to use tablet medication to quit smoking and minority smokers with MIs were less likely to use nicotine replacement. Practitioners should promote pharmacotherapy for smoking cessation and allay patient concerns about the effects of medication on their disability and drug-drug interactions.

Table 1**Sample Characteristics**

<u>Total Sample n=152</u>	
Female	53.3%
Age	50.07 years (SD=8.62)
Equipment used to ambulate	73.0% Cane
	23.7% Walker
	18.4% Wheelchair
	8.6% Leg Braces
	6.6% Crutches
	5.9% Prosthetic Leg
	3.9% Scooter
Ethnicity	61.2% Caucasian
	18.4% African American
	10.5% Multi-racial
	4.6% American Indian
	2.6% Hispanic
	1.3% Asian
	1.3% other
Earned \$10,000 or less per year	47.4% ^a
Achieved a high school education	25.7%
<u>Among current smokers (n = 131)</u>	
Cigarettes per day	15.76 (SD=9.45)
Have first cigarette within 30 mins. of awakening	72.5%

^a 15 participants are missing this item

Table 2

Desire to quit among current smokers with mobility impairments (n=131) vs. general population samples

Location	Current sample		WI Tobacco control	Hughes et al 2009	McClave et al 2010	Gibson et al 2010	Curry et al 2007	CDC 2011
	RI/MA		WI	VT	19 States	USA	USA	USA
Year of Survey	2008-11		2001	2004	2003-07	2002-5	2005	2010
Quit for > 24 hours in the past year	57.3%		49%	≈37.8% ^a	46.8% ^b	38.8%	≈42.3% ^c	52.4%
Planned to quit within 30 days	62.0%			29.3%	26.6% ^b			
Considering quitting within 6 months	88.4%				58.4% ^b	32.5%		

^aThis value was estimated from 2 sources of data in Hughes et al (2009)

^bMedian state level

^cCombination of “young” and “older” adult groups presented in Curry et al 2007

Table 3
Lifetime use of Quit Methods among total sample (n = 152) compared to general population samples

Location	Current sample		WI Tobacco control 2003		Ryan et al 2011	Hughes et al 2009	Vallone 2011	DiClemente et al 2010	
	RI/MA	WI	WI	WI	SC	VT	8 US Cites	MD	
Year of Survey	2008-11	2001	2001	2001	2008	2004	2007-8	2006	
	Current+ Former	Current	Former	Current	Current	Current ^d	Current	Current+ Former	
Cold Turkey:	75.0%	80%	84%						
Phone Counseling	2.6%					12%			
Individual Counseling	1.3%					9%			
Cessation Clinic	1.3%								
Group Counseling:	.7%					8%			
Any Psychosocial:	5.3%					21%			
Patch	36.8%	28%	12%	≈20% ^d	41%				
Gum	19.7%	20%	12%	≈10% ^d	22%				
Nasal spray	0%			≈1% ^d					
Inhaler	1.3%			≈1% ^d	7%				
Any NRT	46.1%			52%				39%	
Tablet Medication	8.6%	18% ^b	5%	≈6% ^c ^d , ≈10% ^b ^d	24% ^b				
Any Pharmacological aid	48.0%			≈33% ^d	57%		39%		

^aCurrent smokers with attempt in past year

^bBupropion only

^cVarenicline only

^dCombination of Caucasian and African American data presented in Ryan et al 2011