Published in final edited form as:

J Health Psychol. 2016 October ; 21(10): 2306–2313. doi:10.1177/1359105315576347.

Caregivers' interest in using smokeless tobacco products: Novel methods that may reduce children's exposure to secondhand smoke

Theodore L Wagener^{1,2}, Alayna P Tackett^{2,3}, and Belinda Borrelli⁴

¹The University of Oklahoma Health Sciences Center, USA

²Oklahoma Tobacco Research Center, USA

³Oklahoma State University, USA

⁴Boston University Henry M. Goldman School of Dental Medicine, USA

Abstract

The study examined caregivers' interest in using potentially reduced exposure tobacco products for smoking cessation, reduction, and to help them not smoke in places such as around their child, as all three methods would potentially lead to reduced secondhand smoke exposure for their children. A sample of 136 caregivers completed carbon monoxide testing to assess smoking status and a brief survey. Few caregivers had ever used potentially reduced exposure tobacco products (<1%), but a majority were interested in trying them as means of smoking reduction (54%), to quit/stay quit from smoking (51%), and to help them not smoke around their child or in the home (55%). Caregivers less motivated to quit smoking and with no home smoking ban were more interested in using potentially reduced exposure tobacco products to help them quit/stay quit from smoking ($p < .05$).

Keywords

harm reduction; potentially reduced exposure tobacco products; secondhand smoke exposure; smokeless tobacco products

Introduction

Children experience the highest amount of secondhand smoke exposure (SHSe) of all age groups, with more than 50 percent of children in the United States exposed to secondhand smoke (Center for Disease Control (CDC), 2010). Secondhand smoke is toxic and carcinogenic, and children's exposure to it often leads to significant health consequences, including respiratory illness, sudden infant death syndrome, ear infections, asthma, and impaired pulmonary function (American Academy of Pediatrics Committee on

Reprints and permissions: sagepub.co.uk/journalsPermissions.nav

Corresponding author: Theodore L Wagener, Oklahoma Tobacco Research Center, The University of Oklahoma Health Sciences Center, 1200 Children's Avenue, Suite 12400, Oklahoma City, OK 73104, USA. theodore-wagener@ouhsc.edu.

Environmental Health, 1997; DiFranza et al., 2004; US Environmental Protection Agency, 1992).

Despite public smoking bans, many children living with smokers have experienced no reduction in SHSe (Dove et al., 2010; Pirkle et al., 2006). Furthermore, clinical interventions attempting to motivate caregiver smoking cessation or smoking outdoors often lead to only modest reductions in children's SHSe (Rosen et al., 2012). Unfortunately, a majority of parents either fail to make a quit attempt, resume smoking after attempting to quit, or do not keep a smoke-free home and car (Hovell and Hughes, 2009; Priest et al., 2008; Rosen et al., 2012).

Additional methods of SHSe reduction should be considered and evaluated. Asking parents to substitute smoke-free, nicotine-containing products anytime they are in their home, car, or around their children may be an alternative method to reduce children's SHSe if they are not motivated to quit smoking. Noncombustible, nicotine-containing products, such as nicotine replacement therapies (NRT; e.g. nicotine gum, lozenge, and inhaler) and potentially reduced exposure tobacco products (PREPs; i.e. snus, dissolvable tobacco lozenges, and electronic cigarettes), are effective in reducing smokers' craving for combustible cigarettes (e.g. Kotlyar et al., 2011) and in reducing the number of cigarettes smoked (Fagerstrom et al., 2012; Mendoza-Baumgart et al., 2007; US Department of Health and Human Services, 2006). NRT are approved as smoking cessation products by the US Food and Drug Administration (FDA) and typically contain non-detectable levels of harmful tobacco-related toxins (e.g. tobacco-specific nitrosamines), and although PREPs often have detectable levels, they are at much lower levels than traditional combustible cigarettes and traditional smokeless tobacco (Kotlyar et al., 2011; Mendoza-Baumgart et al., 2007). PREPs, however, are not approved for cessation by the FDA. The PREPs category includes the following products: snus (e.g. Marlboro Snus and Camel Snus), a moist, powdered, flavored tobacco product that is contained in a sachet that is placed under the upper lip and does not require spitting; dissolvable tobacco, a flavored, smoke-free, spit-free tobacco product that dissolves in the mouth and comes in a variety of forms including compressed tobacco lozenges (Ariva and Stonewall), as well as sticks, strips, and orbs (Camel and Marlboro); and electronic cigarettes, a battery-powered device that heats a solution of nicotine, flavorants, and excipients into an aerosol that is then inhaled by the user. To date, no studies have investigated the use of PREPs and their impact on SHSe reduction. One study examined parent's interest in using NRT for SHSe reduction, but this study was qualitative. The results from the qualitative study showed little support for the use of NRT to reduce SHSe because of prior unsuccessful experiences with NRT and beliefs that NRT should only be used for serious quit attempts (Atkinson et al., 2013).

Because PREPs are marketed as recreational tobacco products rather than a cessation product, they may have less stigma and be more acceptable to smokers who do not want to quit smoking. PREPs may also be preferred over NRT due to better taste and fewer side effects (Caldwell et al., 2010; Mendoza-Baumgart et al., 2007). Moreover, research suggests that smokers' use of PREPs increases motivation and confidence to quit smoking and results in fewer cigarettes smoked (e.g. Carpenter and Gray, 2010), suggesting that they may serve a similar role for caregivers as a potential method of cessation induction.

Therefore, this study assessed caregivers' previous use and future interest in using PREPs, as a way to help them not smoke in places where they are advised like in the home and around their child. Furthermore, because smoking cessation and possibly reduction by caregivers would also be beneficial to reducing children's SHSe, we also examined caregiver interest in using PREPs as a means of helping them quit or stay quit from smoking and to reduce their smoking. Given the exploratory nature of the study, we also investigated whether interest in PREP use differed based on caregivers' current smoking status, presence of a home smoking ban, child's health status (asthma vs no asthma), and motivation to quit smoking. We examined both snus and dissolvable tobacco lozenges but did not include electronic cigarettes because at the time of data collection (January–December 2011), e-cigarettes were not as popular or readily available as they are currently.

Methods

Participants and procedures

All caregivers were participants of a large randomized clinical trial providing home-based asthma education in addition to one of the two different smoking cessation induction interventions (R01 HL062165, B. Borrelli). Both interventions utilized a motivational interviewing approach, with similar content; however, one intervention provided six additional follow-up calls to help prevent relapse or motivate another quit attempt (if needed), while the other provided six contact control calls focused on child wellness (diet, exercise, safety). Neither of the interventions discussed PREPs or harm reduction. During the last year of the trial (January–December 2011), participants who were completing their final follow-up visit (12-month) were asked to complete an additional survey (PREPs survey) of their experience with, and interest in, using PREPs as a means of quitting or reducing smoking and to help them not smoke in places such as around their child or in the home. Participants included 136 caregivers of a child between the ages of 3 and 17 years who smoked and had a child with or without asthma. Caregivers were not required to want to quit smoking to be eligible for the larger study, but had the option to receive the nicotine patch at no cost if they were ready to quit. A study research assistant administered all study measures during the final assessment point (12 months). The study was approved by the university Institutional Review Board and was conducted in compliance with the American Psychological Association ethical guidelines.

Measures

Caregiver and child demographic information were collected at baseline; all other measures were collected at the 12-month follow-up visit. Caregivers self-reported 7-day smoking abstinence ("Have you smoked any cigarettes or used other tobacco, even a puff, in the last 7 days?"), and this was biochemically confirmed by measuring exhaled carbon monoxide (CO) using a Micro Smokerlyzer monitor (Bedfont Scientific Ltd, 2011), with CO < 10 ppm indicating abstinence. The presence of a self-reported total home smoking ban (no one smokes anywhere or anytime in the home) was assessed (yes/no). Motivation to quit smoking was assessed with the Contemplation Ladder (Biener and Abrams, 1991), a validated one-item scale that ranges from 0—"No thought of quitting"—to 10—"Taking

action to quit.” Experience with and interest in using PREPs was assessed with a 15-item survey (see Table 1).

Data analytic plan

Descriptive statistics were conducted on demographic variables and measures collected at the 12-month follow-up, including smoking status, motivation to quit, presence of a total home smoking ban, and caregiver interest in using PREPs. For all further analyses, caregiver interest in using PREPs was dichotomized as “interested” (by combining responses of “somewhat interested” and “very interested”) or “not interested.” Caregiver interest in using PREPs was examined across child health status (asthma vs healthy) and whether the child lived in a home with a smoking ban in place (total home smoking ban vs not) with chi-square tests. Differences in level of motivation to quit smoking among caregivers interested versus not interested in using PREPs were examined with a Mann–Whitney *U* test.

Results

A total of 136 caregivers (85% female; $M_{\text{age}} = 37.1$, standard deviation (SD) = 9.4 years) completed the PREPs survey. And 112 caregivers reported continued smoking and 24 were biochemically verified quit. Complete demographics are presented in Table 2.

Previous use of PREPs

Only 3 out of the 136 caregivers reported ever use of PREPs (defined as snus or dissolvable tobacco). All three caregivers reported use of snus, and one of the three reported use of snus and dissolvable tobacco (i.e. Camel Strips). Reasons for trying these products were reported as “just to try them,” “help to reduce number of cigarettes smoked,” and “to smoke in places where smoking is not allowed.” Two of the three caregivers reported that the products were helpful in curbing the urge to smoke. Similarly, two of the caregivers had some interest in trying these products or products like these to help them as a means of smoking reduction, cessation, and to help them not smoke around their child, or in the home or car.

Interest in using PREPs

Of the 112 caregivers who had not already quit smoking, 55 percent reported being somewhat or very interested in trying PREPs to help them either quit or stay quit from smoking, 54 percent to help them cut down on their smoking, and 55 percent to help them not smoke in places where they are advised not to, such as the home, car, and around their child. A total of 7 of 24 (29.2%) of those who had quit were also interested in using smoke-free, nicotine-containing products as means of helping them “stay quit from smoking” regular cigarettes (see Table 3).

Child health status was not associated with interest in using PREPs to quit/stay quit (H: 56% vs A: 44%), reduce smoking (H: 56% vs A: 50%), or in places where one is advised not to like in the home and around their children (H: 59% vs A: 50%); all analyses ($p > .05$). However, those who were interested in trying PREPs to help quit or stay quit from smoking were less motivated to quit smoking ($M_{\text{dn}} = 7.0$ vs $M_{\text{dn}} = 8.0$) than those caregivers who reported no interest in using PREPs for that reason ($U = 1678.0$, $z = -2.57$, $p = .010$). Also,

caregivers who did not currently have a household smoking ban in place were more likely to be interested in using PREPs to help them quit or stay quit from smoking (64% vs 45%; $X^2(1) = 3.93, p = .048$); similarly, a non-significant trend was seen for those without a household smoking ban also being more likely to be interested in using PREPs to help them not smoke in places where they are not advised (66% vs 49%; $X^2(1) = 2.74, p = .098$). There were no other significant findings between caregivers who were interested versus not (i.e. to reduce or in places where it is not advised) in terms of motivation to quit smoking or the presence of a total household smoking ban.

Discussion

To our knowledge, this is the first study to investigate caregivers' interest in using PREPs for smoking cessation, reduction, and to help them not smoke in places such as around their child. All three methods would potentially lead to reduced SHSe for their children. Very few caregivers had ever used PREPs; of those who had never tried them, a little more than half were interested in using PREPs as a means of smoking reduction, cessation, and to help them not smoke in places such as around their child and in their home. Those most interested in using PREPs to help them quit or stay quit from smoking were less motivated to quit smoking and less likely to have a total home smoking ban in place. Our results suggest that caregivers, even those less motivated to quit smoking, would be interested in trying a product, like snus or a dissolvable tobacco lozenge, to help reduce their child's SHSe.

Of those who had quit smoking, 29 percent (7 of 24) were also interested in using PREPs as means of helping them "stay quit from smoking" regular cigarettes. PREPs used in this way may be a potential gateway back to nicotine addiction for some quitters and, although the use of PREPs are less harmful than cigarettes, they are not harmless (Levy et al., 2006). However, the advantages of this approach could be that PREPs may be perceived as an acceptable tool for consumers to prevent relapse to smoking. This benefits both the smoker and their children who would potentially remain less exposed to cigarette smoke. More research is needed to help providers and consumers weigh the costs and benefits of advocating use of PREPs for smoking cessation, reduction, or to use in places where smokers are advised not to smoke. The current literature base examining the use of PREPs by smokers suggests that PREP use increases motivation and confidence to quit smoking and results in fewer cigarettes smoked (Carpenter and Gray, 2010). The current data, however, only assess caregiver interest in using PREPs; it is not yet clear whether caregivers will find these products satisfying or helpful as a substitute for smoking in the home, car, or around their child. Furthermore, although not evaluated in this study, it is possible that a reason why a little less than half of the caregivers sampled were not interested in using PREPs was a lack of interest in switching to an oral tobacco product. Many of the caregivers were women, and women make-up a very small part of tobacco users who use oral tobacco products (0.4%; US Department of Health and Human Services, 2014). Also, it is possible that some caregivers do not feel comfortable using a recreational, non-FDA approved product for reduction, cessation, or for not smoking in the home or around their child. This is a needed area of future investigation to more fully appreciate the potential impact of these novel methods.

Although caregivers' quitting all tobacco products is preferred, the findings from this study suggest some potential innovative means that could result in reducing children's SHSe; however, several limitations are noted. First, the caregivers in this study were participating in a clinical trial; therefore, these findings may not generalize to all caregivers who smoke. However, smokers did not have to want to quit smoking to be enrolled in the trial, which may partly mitigate this concern. Second, given the cross-sectional nature of the investigation is not clear whether caregivers who were interested in trying PREPs would find them a satisfactory substitute for cigarettes or continue to use them for the intended purpose of reducing SHSe, if provided the opportunity. Third, the majority of the sample was female caregivers, and therefore, the findings may not generalize as well to male caregivers who smoke. Fourth, because the larger clinical trial enrolled only the primary caregiver, it is possible that in households where more than one caregiver smokes, this method would still be ineffective for reducing SHSe if the other caregiver was not interested in using PREPs for any of the reasons examined. Finally, given the timing of data collection, we did not evaluate caregivers' interest in using e-cigarettes. Arguably, given the proliferation of these products as compared to snus and dissolvable tobacco, it is likely that caregivers would be as if not more interested in using e-cigarettes.

In spite of the limitations, this study is the first to examine the use of PREPs among caregivers, for the purposes of smoking cessation, reduction, and to help them not smoke around their child or in the home. Overall, the findings suggest that caregivers are at least somewhat interested and further investigations are warranted. This method, although not the optimal choice (i.e. quitting all tobacco products), could confer a substantial health benefit to the child and potentially to the caregiver.

Acknowledgments

Funding

This work was supported by the National Institutes of Health (NHLBI R01HL062165 to B.B.); during the preparation of this article, T.L.W. was supported by the Oklahoma Tobacco Research Center (OTRC), which is funded by the Oklahoma Tobacco Settlement Endowment Trust (TSET). NHLBI, OTRC, and TSET had no role in the study design, collection, analysis or interpretation of the data, writing the article, or the decision to submit the article for publication.

References

- American Academy of Pediatrics Committee on Environmental Health. Environmental tobacco smoke: A hazard to children. *Pediatrics*. 1997; 99:639–642. [PubMed: 9093321]
- Atkinson O, Coleman T, McNeill A, et al. The role of nicotine replacement therapy for temporary abstinence in the home to protect children from environmental tobacco smoke exposure: A qualitative study with disadvantaged smokers. *BMC Public Health*. 2013; 13:262. [PubMed: 23521825]
- Bedfont Scientific LTD. 2011. Available at: <http://www.bedfont.com/smokerlyzer/micro>
- Biener L, Abrams DB. The contemplation ladder: Validation of a measure of readiness to consider smoking cessation. *Health Psychology*. 1991; 10:360–365. [PubMed: 1935872]
- Caldwell B, Burgess C, Crane J. Randomized crossover trial of the acceptability of snus, nicotine gum, and Zonnic therapy for smoking reduction in heavy smokers. *Nicotine & Tobacco Research*. 2010; 12:179–183. [PubMed: 20064899]

- Carpenter MJ, Gray KM. A pilot randomized study of smokeless tobacco use among smokers not interested in quitting: Changes in smoking behavior and readiness to quit. *Nicotine & Tobacco Research*. 2010; 12:136–143. [PubMed: 20053788]
- Center for Disease Control (CDC). Vital signs: Nonsmokers' exposure to secondhand smoke—United States, 1999–2008. *Morbidity and Mortality Weekly Report*. 2010; 59(35):1141–1146. [PubMed: 20829748]
- DiFranza JR, Aligne CA, Weitzman M. Prenatal and postnatal environmental tobacco smoke exposure and children's health. *Pediatrics*. 2004; 113:1007–1015. [PubMed: 15060193]
- Dove MS, Dockery DW, Connolly GN. Smoke-free air laws and secondhand smoke exposure among nonsmoking youth. *Pediatrics*. 2010; 126:80–87. [PubMed: 20530079]
- Fagerstrom K, Rutqvist LE, Hughes JR. Snus as a smoking cessation aid: A randomized placebo-controlled trial. *Nicotine & Tobacco Research*. 2012; 14:306–312. [PubMed: 21994343]
- Hovell MF, Hughes SC. The behavioral ecology of secondhand smoke exposure: A pathway to complete tobacco control. *Nicotine & Tobacco Research*. 2009; 11:1254–1264. [PubMed: 19776346]
- Kotlyar M, Hertsgaard LA, Lindgren BR, et al. Effect of oral snus and medicinal nicotine in smokers on toxicant exposure and withdrawal symptoms: A feasibility study. *Cancer Epidemiology Biomarkers & Prevention*. 2011; 20:91–100.
- Levy DT, Mumford EA, Cummings KM, et al. The potential impact of a low-nitrosamine smokeless tobacco product on cigarette smoking in the United States: Estimates of a panel of experts. *Addictive behaviors*. 2006; 31(7):1190–1200. [PubMed: 16256276]
- Mendoza-Baumgart MI, Tulunay OE, Hecht SS, et al. Pilot study on lower nitrosamine smokeless tobacco products compared with medicinal nicotine. *Nicotine & Tobacco Research*. 2007; 9:1309–1323. [PubMed: 18058349]
- Pirkle JL, Bernert JT, Caudill SP, et al. Trends in the exposure of nonsmokers in the U.S. population to secondhand smoke: 1988–2002. *Environmental Health Perspectives*. 2006; 114:853–858. [PubMed: 16759984]
- Priest N, Roseby R, Waters E, et al. Family and carer smoking control programmes for reducing children's exposure to environmental tobacco smoke. *The Cochrane Database of Systematic Reviews*. 2008; 4 CD001746.
- Rosen LJ, Noach MB, Winickoff JP, et al. Parental smoking cessation to protect young children: A systematic review and meta-analysis. *Pediatrics*. 2012; 129:141–152. [PubMed: 22201152]
- US Environmental Protection Agency. *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*. Washington, DC: Environmental Protection Agency, Office of Research and Development, Office of Air and Radiation; 1992.
- US Department of Health and Human Services. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 709; 2006.
- US Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.

Table 1**PREPs survey.**

Have you ever used any of the following smokeless tobacco products?

1. Snus (Camel Snus, Marlboro Snus, Swedish Snus, etc.)?

a. Yes

b. No

2. Stonewall?

a. Yes

b. No

3. Ariva?

a. Yes

b. No

4. Camel Orbs?

a. Yes

b. No

5. Camel Strips?

a. Yes

b. No

6. Camel Sticks?

a. Yes

b. No

7. I have never used any of these products (Skip to question 13)

Why did you use these smokeless tobacco product(s)

8. Help you quit smoking?

a. Yes

b. No

9. Help you reduce your smoking?

a. Yes

b. No

10. Help you not smoke in situations where you weren't allowed to smoke?

a. Yes

b. No

11. Other (specify) _____

12. How helpful was the product(s) in curbing your urge to smoke?

1. Not at all helpful

2. A little helpful

3. Helpful

4. Very helpful

5. Extremely helpful

13. To what extent are you interested in trying one of these products as a way to help you quit or stay quit from smoking?

1. Not at all interested

2. Somewhat interested

3. Very interested

14. To what extent are you interested in trying one of these products as a way to help you cut down on your smoking?

1. Not at all interested

2. Somewhat interested

3. Very interested

15. To what extent are you interested in trying one of these products as a way to help you not smoke in situations where you are advised to not smoke (around your child, in your home, etc.)?

1. Not at all interested

2. Somewhat interested

3. Very interested

PREP: potentially reduced exposure tobacco product.

Ariva, Stonewall, Camel Orbs, Camel Strips, Camel Sticks are all different types of smokeless oral tobacco that can be used by smokers when they cannot smoke (at work, in public places that do not allow smoking). They are placed in the mouth and are allowed to dissolve. They have no smell and are smoke-free. A pack of 20 is about the same cost as a pack of cigarettes. They come in a variety of flavors.

Table 2

Caregiver and child demographics.

Variable	<i>N</i> (%) or <i>M</i> (SD)
Female caregiver (%)	116 (85.3%)
Female child (%)	56 (41.2%)
Caregiver age (years)	37.2 (9.5)
Child age (years)	7.2 (5.3)
Asthma diagnosis (%)	70 (51.5%)
High school diploma/GED	87 (64.0%)
Partnered	29 (22.0%)
Employed full/part time	56 (41.0%)
Ethnicity	
American Indian	9 (6.6%)
Asian	1 (0.7%)
African American	40 (29.4%)
Caucasian	69 (50.7%)
Hispanic Caucasian	12 (8.8%)
Hispanic African American	7 (5.1%)
Other	8 (5.8%)
Declined to answer	2 (1.4%)
Current Smoker ^{a,c} (%)	112 (82.4%)
Motivation to quit smoking ^{a,b,c}	8.7 (2.0)
No. of cigarettes per day ^{a,b,c}	6.9 (6.8)
Complete home smoking ban ^c (%)	73 (64.6%)

SD: standard deviation; GED: general equivalency diploma.

^aCaregivers only as no children were reported smokers.^bAmong caregivers who smoke.^cVariable assessed at 12-month follow-up visit.

Table 3

Caregivers' interest in using PREPs.

Variable	<i>N</i>	Not interested (%)	Somewhat interested ^c (%)	Very interested ^c (%)
Quit/stay quit ^a	136	49.6	26.3	24.1
Cut down on smoking ^b	112	46.0	27.4	26.5
Not smoke where advised not to ^b	112	45.1	27.4	27.4

PREP: potentially reduced exposure tobacco product.

^aIncludes all caregivers.^bIncludes only caregivers who currently smoke.^cCombined for analyses.