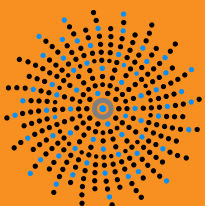


# Workplace Tobacco Cessation Initiatives for Young Adults

Prepared for PTCC by the Propel Centre for Population Health Impact



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The Propel Centre for Population Health Impact (Propel) is a collaborative enterprise that conducts research, evaluation and knowledge exchange to move evidence into action, accelerating improvements in the health of populations in Canada and around the world. Supported by a Canadian Cancer Society Research Institute major program grant (2011-2016), the University of Waterloo and more than 30 grants and contracts from federal and provincial governments and NGOs, Propel's niche is relevant and rigorous science that informs policies and practice to prevent cancer and chronic disease.

# TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	1
1 INTRODUCTION .....	2
2 METHODS .....	2
2.1 Search Strategy.....	2
2.1.1 Databases .....	3
2.2 Search terms .....	3
2.3 Search Outcomes.....	4
3 RESULTS .....	6
3.1 Trends in Tobacco Use among Young Adults .....	6
3.1.1 Predictors of Tobacco Use .....	6
3.1.2 Smoking Patterns .....	7
3.1.3 Quit Behaviours and Cessation Programs .....	7
3.1.4 Mass Media .....	8
3.1.5 Using New Technologies in Tobacco Use Research.....	8
3.2 Occupation and Smoking Status.....	9
3.2.1 Tobacco Use among Blue Collar and Service Workers.....	9
3.2.2 Occupation and Workplace Characteristics Associated with Tobacco Use.....	11
3.3 Workplace Interventions.....	13
3.3.1 Individual-Focused Interventions .....	13
3.3.2 Workplace-level Interventions .....	15
4 CONCLUSIONS .....	16
4.1 Implications for research: .....	18
4.2 Implications for policy/practice: .....	18
REFERENCES.....	19

## FIGURES

Figure 1: Search Results Overview .....	5
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## EXECUTIVE SUMMARY

Nearly one in four Canadian young adults is a current smoker. While many studies have reported on tobacco use trends and interventions within the college and university population, very little research has focused on young adults in the workplace. For this report, a search strategy was used to identify articles specific to young adults and tobacco use published since 2008. Due to time restrictions, this review does not include all articles resulting from the search strategy and instead highlights findings that met at least one of our two objectives: 1) identify novel trends in smoking behaviour and this research in the general young adult population and 2) identify studies most relevant to the workplace setting and workplace interventions. As no workplace interventions strictly recruited young adults, all relevant blue collar and service workplace interventions resulting from the general young adult tobacco use search were reviewed.

The review identified that smoking behaviour is predicted by movie exposure at a younger age, alcohol and illegal drug use, and the social environment, including peer influences. Tobacco use is consistent across the young adult years; suggesting that initiation occurs earlier and prevention efforts should focus on a younger age group. Prevention efforts should also target multiple forms of tobacco use. The majority of current young adult smokers prefer to quit without the aid of individually-focused interventions (e.g. counselling or nicotine patches). Former smokers are more likely to be involved with substitutive behaviours (e.g. sports). Thus, conducting population-level interventions (e.g. workplace policies and mass media campaigns) and increasing the number of opportunities for substitutive activities (i.e. alternative behaviour and activities) may be more effective for tobacco cessation among young adults. Finally, recent studies have used mobile technologies as a new medium for program delivery, but ethical and practical challenges need to be overcome before they can be widely accepted for clinical use.

Smoking rates are highest among blue collar workers and very few studies focused on young adults in blue collar occupations. Several characteristics of blue collar and service workplaces were associated with tobacco use, such as shift work, social culture, and workplace policies. Five blue collar and service workplace interventions were identified from the literature review – two were individual-focused interventions and three evaluated the effects of implementing workplace tobacco use policies. The individual intervention studies support the use of apprentice programs for targeting this population and the effectiveness of telephone-delivered cessation programs for workers who frequently travel (e.g. truck drivers). The workplace interventions studies suggest that workplace policies can increase the likelihood of tobacco use cessation and reduce employee exposure to second-hand smoke. While worksite smoking policies are effective, there remains the challenge of implementing these policies in open air settings (e.g. construction sites).

Implications for both research and policy/practice were identified. Future research is needed to better understand the characteristics, smoking predictors, and quit behaviours among populations with high smoking rates, specifically young adults in blue collar and service occupations. Also, more research is needed to determine the effectiveness of programs delivered via mobile technology. Policy makers need to target tobacco use early, as tobacco use initiation often occurs before the age of 18. Young adult cessation interventions should be tailored to the target population (e.g. apprentices) and smoking bans in the workplace can be effective for improving tobacco-related health outcomes. Overall, young adults in blue collar and service occupations are a high risk population and should be a priority for future initiatives.

## 1 INTRODUCTION

Smoking continues to be a major public health concern, particularly among young adults. The most recent Canadian Tobacco Use Monitoring Survey indicates that 22% of young adults (aged 20-24) were current smokers in 2010, the highest prevalence among the age categories evaluated. This smoking rate is largely unchanged from the 23% reported in 2009, but is significantly lower than the 25% reported in 2007 (Health Canada, 2011). Of particular interest is the reduction in smoking among young adult males from 28% in 2007 to 24% in 2010. Smoking rates did not differ significantly between males and females in 2010 (Health Canada, 2011). Since rates of smoking have decreased among youth (aged 15-17) and are the lowest rate recorded (9%), the prevalence of smoking among young adults is expected to be lower in the upcoming years (Health Canada, 2011).

The purpose of this review was to provide an overview of the most recent literature on young adult smoking behaviour, including issues related to smoking among blue collar and service workers. The review follows up on a literature review conducted in 2008 (see Filsinger & McGrath, 2008) and considers the pair to be a reasonable overview of the literature to date, although not a systematic review. The two main objectives for this brief review were as follows:

1. To identify:
  - a. Recent literature (2008-2012) related to trends in smoking behaviours and smoking behaviour research among young adults in the general population.
2. To identify:
  - a. Characteristics of blue collar and service occupations that may be associated with smoking prevalence among this population.
  - b. Major workplace interventions that target smoking behaviours among blue collar and service workers.

## 2 Methods

### 2.1 Search Strategy

To update the literature review conducted in 2008 (see Filsinger & McGrath, 2008), the initial methods used were repeated with some minor changes due to time constraints: only published literature was examined by searching in relevant databases (neither a grey literature, nor a hand search of key journals was conducted); and we only searched for smoking interventions rather than conducting a search on other health-related interventions for young adults.

In order to stay true to the original intent of the first review, initial inclusion criteria were as follows:

- Published in 2008 or later (and not included in first review which was written in 2008)
- Published in the English language
- Relevant to the Canadian context (i.e. developed nations, specifically North America, Europe, Australia and New Zealand)
- Primarily focused on young adults (19-24 and/or 25-30)
- Provides occupation of the sample (trades, student, unemployed, etc.) or socioeconomic factors
- Any form of tobacco use (e.g. cigarettes, chewing, snuff)
- Any topic related to tobacco use (e.g. addiction, cessation, intervention, policies)

Upon further consultation within PTCC and discussion within Propel, the focus was narrowed to **workplace interventions**. It is important to note that the workplace interventions that were found were not specific to young adults, and workplace interventions were not searched broadly (i.e. a broad search of workplace interventions without also using young adult terms). However, it was felt that workplace interventions were of greatest interest at this time to PTCC, the Ministry of Health and Long-Term Care and other partners of PTCC.

During the search, a number of articles were identified that focused on predictors of smoking. As several of these contained information relevant to designing and implementing workplace interventions for the target population, a brief summary of key findings is provided in the results section.

### **2.1.1 Databases**

The databases were chosen from those used in the 2008 review. The following databases were searched:

- Cochrane Library
- CINAHL
- ERIC
- ISI Web of Science
- Medline (PubMed)
- Psychinfo

## **2.2 Search terms**

Original search terms were examined and adjusted based on changes in databases (i.e. search terms have been added since the 2008 review), and an increase in interventions that are based on technology (i.e. social media, mobile technology). Searches were adapted to each database and used a combination of controlled vocabulary and free-text terms.

Where possible, saved searches from the original review were used. The articles obtained using the original search terms and the revised search terms overlapped, but each set of search terms

provided articles of interest that the other set of terms did not. As such, results from both searches were reviewed.

Population:

- Young adults
- College
- University
- Trade schools
- Apprentice
- Vocational schools

Behaviour/interventions of interest:

- Smoking
- Smoking addiction
- Smoking habituation
- Smoking cessation
- Tobacco use

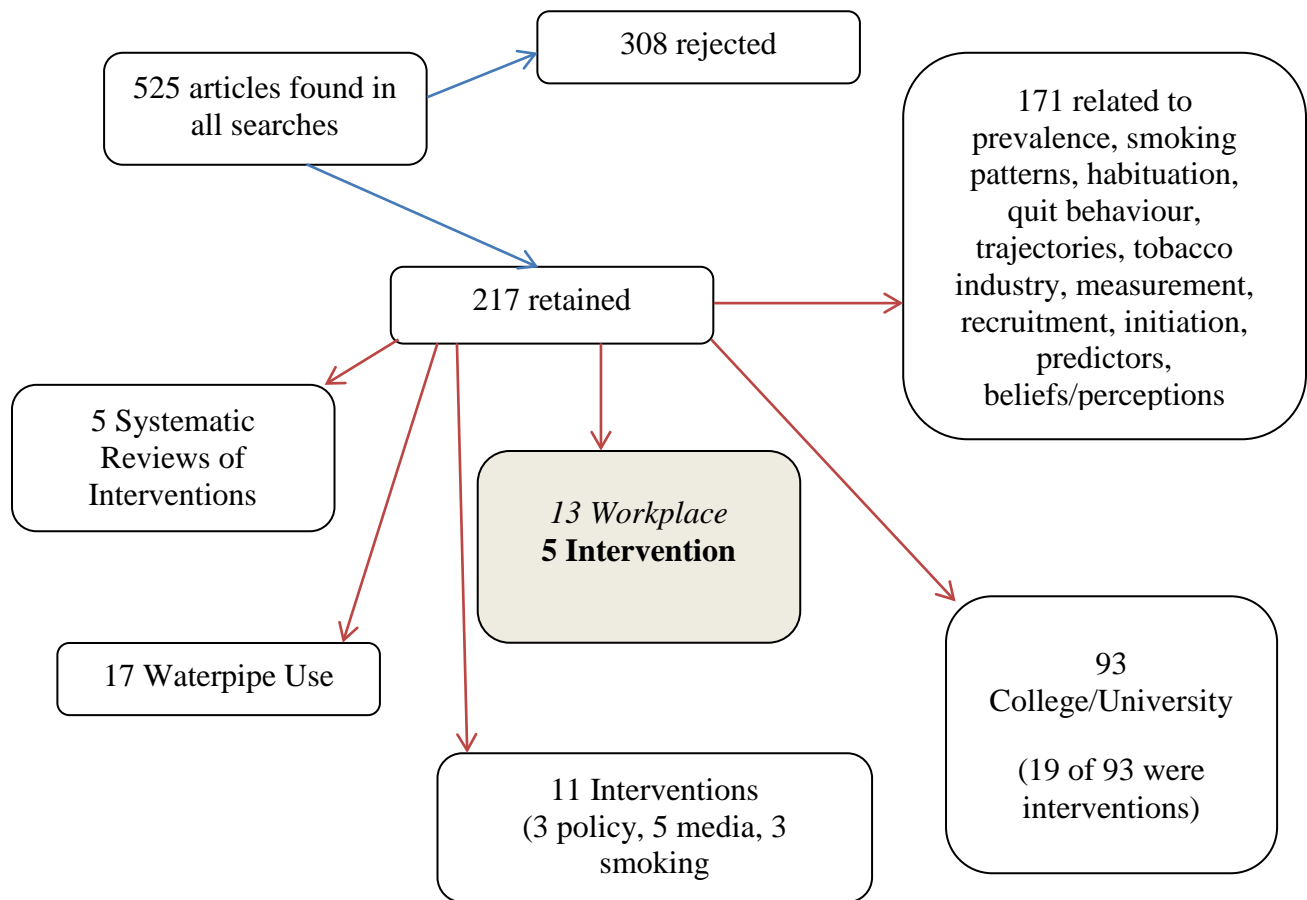
Settings:

- Workplace
- Media
- Social media
- Internet
- Mobile technology

### 2.3 Search Outcomes

Of the 525 articles identified in the search, 308 were excluded based on the abstract or a review of the full paper, if the abstract did not provide sufficient information. Articles meeting the inclusion criteria (n=217) were organized into categories based on the 2008 review (e.g. college/university, prevalence, quit behaviour). Within these initial broad categorizations, articles were further categorized to reflect the type of article (e.g., systematic review, interventions) and / or specific topics that the articles addressed (e.g., waterpipe use, workplace). Figure 1, on the following page provides a general overview of these findings to give an idea of published literature on the different topics that emerged given the search criteria. The category entitled, “other” contained 171 articles that related to prevalence, smoking patterns, habituation, quit behaviour, trajectories, tobacco industry, measurement, recruitment, initiation, predictors, and beliefs/perceptions. Five articles were systematic reviews of interventions. The remaining three categories pertain to topics that are novel and/or were selected as the focus of the current review. Thirteen articles pertained to worksites and an additional five were worksite interventions. Seventeen articles addressed waterpipe use and 11 interventions were specific to smoking cessation/prevention, policy and media. The categories were not mutually exclusive as some articles were assigned to multiple categories. Therefore, the number of articles per category will not sum up to the number of retained articles.

Figure 1: Search Results Overview



Note: These categories are not mutually exclusive as some articles were assigned to multiple categories.



### 3 Results

The results of this report are divided into three parts. Objective 1 is addressed in Section 3.1, reviewing current research on the predictors of tobacco use among young adults, smoking patterns, quit behaviour, effective mass media messaging, and the use of new technologies in tobacco use research. Next, Objective 2, Part A is addressed in Section 3.2, describing the characteristics of blue collar and service workers and characteristics of their workplaces associated with tobacco use. Finally, Objective 2, Part B is addressed in Section 3.3 and reviews the effects of workplace interventions on tobacco use among workers in blue collar and service occupations.

#### 3.1 Trends in Tobacco Use among Young Adults

The first objective of this report was to identify recent literature (2008-2012) related to trends in smoking behaviours and smoking behaviour research among young adults in the general population. The results below were obtained from the systematic reviews and other selected papers that focused on tobacco use trends among young adults. Articles specific to only the college/university context are not included in this section. Although this is not a complete review of this topic, it is provided to present some context around smoking behaviour in the young adult population that occurs in the workplace. Understanding this context is key to developing effective intervention strategies.

##### 3.1.1 Predictors of Tobacco Use

Freedman, Nelson, and Feldman (2012) recently conducted a systematic review of predictors for smoking among young adults in Canada and the United States, covering articles published between 1998 and 2010. The review found that the risk for smoking initiation increased due to exposure to smoking, boredom or stress while serving in the military, attending tobacco-sponsored events in college, and exposure to a social environment that encouraged smoking (e.g. social norms). Initiation of smoking was also associated with alcohol and illegal drug use. Prevention was effective when the individual was exposed to counter-marketing, denormalization campaigns, taxation, and smoke-free policies. The review only identified one paper on young adults who went straight into work (i.e. no college or university) and suggest that the diffusion of this population makes it difficult to target or reach compared the convenience of the university and college students or broader general population (Freedman et al., 2012).

Although college and university students are often used as a convenience sample for tobacco research among young adults, it is important to recognize that this has led to an under-representation of a high risk population in the tobacco research literature. In a large population survey in the US, 24% of service workers and 15% of blue collar workers were young adults aged 18-24 (Ham et al., 2011). Individuals working in these occupations also had the highest prevalence of smoking among working adults (Ham et al., 2011). Another survey from the US reported that about 85% of long-term unemployed men (aged 18-24) are current smokers (Freyer-Adam, Gaertner, Tobschall, & John, 2011). Overall, the populations of young adults who are blue collar workers, service workers, unemployed, or go straight into work need further research to better understand the characteristics and behaviour of these under-researched groups.

Since the review by Freedman and colleagues (2012), there have been five studies of note that identified predictors of smoking behaviour among young adults. First, Dalton and colleagues (2009) found that exposure to movie smoking between ages 10-14 could predict smoking seven to eight years later, and 35% of established smoking could be attributed to movie smoking exposure. Another longitudinal study by Oesterle, Hawkins, and Hill (2011) recruited participants from fifth grade in 1985 and followed them through to 2008. They found that differences in alcohol, tobacco, and marijuana use were consistent from 18 years old across the young adult years, indicating that substance use begins early and efforts should focus on preventing initiation at a younger age (Oesterle et al., 2011). Finally, Harakeh and Vollebergh (2011, 2012) published two studies on the peer influences on smoking among young adults (aged 16-24), and concluded that a peer's actions are more important than what they say and that observing a peer smoking was a strong predictor of smoking behaviour. Verbal peer pressure to smoke was not associated with subsequent smoking behaviour (Harakeh et al., 2011). Also, the increased risk of smoking when observing a peer smoking persisted for electronic mediums (e.g. webcams) (Harakeh et al., 2012). These studies highlight the importance of early intervention and the impact of early interactions on the future health behaviours of young adults.

### **3.1.2 Smoking Patterns**

For young adults who are current smokers, it is important to understand what other forms of tobacco are being used concurrently, as multiple forms may increase the risk of nicotine addiction and other negative health outcomes (Bombard, Pederson, Koval & O'Hegarty, 2009). A systematic review of waterpipe tobacco use found that 10% of university students in the US use this form of smoking, and the highest levels were observed among high school students of Middle Eastern descent (Akl et al., 2011). As such, this may become a larger issue for young adults in future years, particularly among young adults from specific cultural groups, and tailored interventions may be needed. Bombard and colleagues (2009) examined polytobacco use among young adults in Canada, finding that 26.2% of young adults had used multiple forms of tobacco in their lifetime. The most common polytobacco category was current smokers who had ever used cigars. For males, demographic, family and friends, and lifestyle factors were associated with polytobacco use. Females had the same predictors, as well as psychological factors. Males who were polytobacco users were also more likely to use illicit drugs (Bombard et al., 2009). Another study found significant associations between tobacco use and marijuana use (Ramo, Liu, & Prochaska, 2012). Therefore, cessation interventions should consider a comprehensive approach, covering multiple forms of tobacco and possibly other substances.

### **3.1.3 Quit Behaviours and Cessation Programs**

Understanding the quit behaviours of young adults is an essential part of designing effective cessation interventions. A study by Audrain-McGovern and colleagues (2009) investigated substitute behaviours (e.g. sports and hobbies) and complementary behaviours (e.g. alcohol and coffee) associated with smoking. The results suggest that among young adults (aged 18-30), ex-smokers were more likely to substitute behaviours than both treatment seeking and non-treatment seeking smokers. Also, non-treatment seeking smokers had the highest level of complementary behaviours. In this sample, substitute behaviours appeared to play an important role in both quitting and successful abstinence from smoking (Audrain-McGovern et al., 2009). In a survey of young people (aged 16-20) in Norway, the majority of both males (84%) and females (78%)

preferred to quit smoking without the help of individual-level programs, such as health services counselling or nicotine gum or patches (Wium, Overland, & Aaro, 2011). Another study also found that cost and lack of awareness were not reasons for young adult smokers choosing to not seek treatment (Hughes, Cohen & Callas, 2009). Thus, providing more opportunities for substitution activities (e.g. community sports) and population-level interventions (e.g. workplace policies and media campaigns) may be more effective at targeting young adult smokers.

Focusing on unemployed young adults, Smith and colleagues (2010) describe a participatory-based research strategy they used to inform the development of tobacco cessation programs that could be implemented in tandem with a career education and training program for African American young adults in Baltimore. They found that this population does not view smoking as an immediate problem and perceives it as a mechanism for stress relief. However, these unemployed adults are in a period of transition and looking to make changes in their lives, which may be an opportunity for presenting tobacco cessation as a meaningful goal. The authors suggest that programs targeting unemployed young adults need to involve adult mentors as role models and integrate efforts within the larger context of the young adults' lives, while accounting for other issues they are facing (e.g. becoming parents, homelessness). Although the study does not implement or evaluate this type of cessation program, it does draw attention to the unique needs of this population and provides concrete suggestions for future programs.

### **3.1.4 Mass Media**

Mass media campaigns can be an effective method to disseminate information to a large population. A systematic review was conducted to determine the effectiveness of mass media interventions designed to prevent smoking in young people and improve smoking outcomes, attitudes, behaviours, knowledge, self-efficacy, and perceptions (Brinn, Carson, Esterman, Chang, & Smith, 2010). The review identified that successful campaigns had strong theoretical foundations, used formative research when designing the messaging, and broadcast the message for an extensive length of time. While the campaigns did appear effective, they noted many methodological limitations in the evidence reviewed (Brinn et al., 2010). A survey of males and females (aged 12-24) interested in Dakar Rally and Formula One car races found that participants had a high level of spontaneous recall for cigarette brands and the car colour associated with those brands (Beguinet, Gallopel-Morvan, Wirth, Spinosa, & Martinet, 2010), suggesting the indirect ability for mass marketing to convey tobacco-related information. Using focus groups (Grogan, Hartley, Conner, Fry, Gough, 2010) and a quantitative survey (Grogan, Fry, Gough, Conner, 2009) with young adults (aged 17-24), these studies identified that both men and women are concerned with changes in appearance due to smoking, as well as weight control challenges associated with tobacco cessation. The authors suggest that these themes be included in smoking-related campaign messages. As a result of another focus group study, Fry and colleagues (2008) suggest that campaigns need to consider the complex social role that smoking plays in the lives of young adults.

### **3.1.5 Using New Technologies in Tobacco Use Research**

Traylor, Bordnick, and Carter (2008, 2009) used virtual reality technology to investigate the influence of smoking-related cues on cravings. In the first study, they showed the participant an array of cues associated with smoking, which increased the level of cravings in both young

adults and adults. When the cues were removed, young adults reported that cravings were still increased, while the adults reported their cravings returning to baseline levels (Traylor et al., 2008). This finding suggests that the dynamics of cravings are dissimilar between young adults and adults and highlights the difference between these populations. Next they presented virtual reality rooms with social cues for smoking to a group of young adults, stimulating an increase in thoughts of smoking. When olfactory cues were added, the researchers did not find a significant increase in thoughts of smoking or attention to the cues (Traylor, Bordnick, & Carter, 2009). While scent did not elicit a significant change, this study does present a tool that may be useful in future research on cues for smoking behaviour.

A relatively new direction is the use of mobile phones to provide tobacco cessation programs and disseminate information, especially as mobile phone use is a part of daily life for many young adults. A review by Heron and Smyth (2010) describe the use mobile technology (i.e. phones and palmtop computers) to provide ecological momentary interventions as a component of psychosocial and health behaviour treatments. An example of how this technology works in smoking cessation interventions involves text messages being sent to the participant's mobile phone for one week before and for weeks after their quit date (Rodgers et al., 2005). The messages were prepared by an interdisciplinary team and sent at randomly selected times, while also ensuring the individual received five per day. If the participant was having cravings, they could also text the number and receive a reply with tips for coping. The intervention found participants were significantly more likely to quit smoking compared to a control group (Rodgers et al., 2005). A meta-analysis on tobacco cessation programs delivered by mobile phone found significant positive short-term results, but current evidence did not show a long-term effect and more rigorous studies of the long-term effects are needed (Whittaker et al, 2009). Overall, Heron and Smyth (2010) conclude that ecological momentary interventions are promising as they allow greater tailoring of programs and the programs can be sensitive to the individual's current state or surroundings. However, the biggest challenge may be that they are not widely accepted in clinical settings, as ethical and practical issues need to be addressed before broad use.

### **3.2 Occupation and Smoking Status**

Objective 2, Part A was to identify characteristics of blue collar and service occupations that may be associated with smoking prevalence among this population. The approach used was to identify characteristics of both the workers themselves (see Section 3.2.1) and characteristics of the workplace (see Section 3.2.1) associated with smoking.

As noted in Section 3.1.1, there is very little research on young adults who do not pursue college or university. Although the focus of this paper remains on young adults, very few articles in the young adult literature discuss blue collar and service workers; as a result, the studies reviewed below are those that resulted from the literature review but do not exclusively target this age group. We will highlight information specific to young adults where available, but will otherwise discuss features of the general blue collar and service population that can inform research and practices with these priority populations.

#### **3.2.1 Tobacco Use among Blue Collar and Service Workers**

Blue collar and service workers represent slightly different populations. According to the United States Current Population Survey – Tobacco Use Supplement, blue collar workers are

predominantly male (85%), are less likely to have a college degree compared to the general population of US workers (15% versus 41%), and are less likely to earn more than \$50,000 annually (38% versus 50%). Service workers are mostly women (58%), are less likely to have a college degree compared to the general population of workers (21% versus 50%), and are in the lowest paid occupational category with 31% earning more than \$50,000 annually (Ham et al., 2011).

Numerous studies have noted that smoking prevalence is highest among blue collar and service workers in both Canada (e.g. Schwartz et al., 2010) and the US (e.g. Ham et al., 2011). As of 2007/2008, 28% of sales and service, 30% of manufacturing, and 36% of trades workers in Canada were current smokers, including both daily and occasional use (Physicians for a Smoke-Free Canada, 2010). Similarly, in Ontario, 24% of sales and service, 30% of manufacturing, and 36% of trades workers were current smokers (Schwartz et al., 2010). In the US, as of 2006/2007, 12% of white collar workers, 20% of service workers and 24% blue collar workers were current daily smokers – the prevalence of all current smokers was not provided (Ham et al., 2011).

For young adults (aged 18-24) in particular, those employed in the US as precision production, craft, or repair workers were most likely to currently smoke (40%), followed by machine operators, assemblers, and inspectors (39%), transportation occupations (38%), and service occupations (33%) (Caban-Martinez et al., 2011). In addition, precision production, craft, and repair workers were 3.9 times more likely to smoke compared to young adults employed in a professional specialty occupation (e.g. chemist, lawyer, or musician). In an intervention study focusing on trade apprentices (n=1,679; mean age = 28), 42% were current smokers at baseline and the average age of initiation was 16.5 years old (Okechukwu, Nguyen, & Hickman, 2010). As noted in the previous review (Filsinger & McGrath, 2008), the number of registered apprentices in Canada substantially increased from 1994 to 2004, with approximately half being in their twenties. As such, blue collar and service workers, including apprentices, should be a population of interest for future research and tobacco cessation initiatives.

Ham and colleagues (2011) examined intensity of tobacco use, rates of initiation, and rates of cessation across occupational categories in the US. They found that blue collar workers are the heaviest smokers, with 20% of current daily smokers having more than 20 cigarettes per day, compared to 11% of service workers and 9% of white collar workers. Compared to white collar workers, blue collar workers have both a higher rate of lifetime smoking initiation (46% versus 33%) and the highest rate of persistent smoking among those who have ever smoked (52% versus 35%). Service workers have a rate of initiation similar to white collar workers (38%), but the same rate of persistence as blue collar workers (52%), indicating that fewer start smoking but they are not likely to quit after they begin (Ham et al., 2011; for longitudinal graphs on smoking trends among service, blue collar, and white collar workers from 1993-2006, see Ham et al., 2011). Finally, 39% of blue collar workers, 42% of service workers, and 46% of white collar workers indicated that they intend to quit smoking “within the next 6 months” (Ham et al., 2011).

Blue collar workers have the same number of quit attempts, compared to white collar workers, but are less likely to be successful in achieving cessation (Barbeau, Krieger, & Soobader, 2004; Ham et al., 2011). This scenario has led to a widening gap between blue collar and white collar workers across decades (Ham et al., 2011). In a comparison of service, blue collar, and white

collar workers, service workers were the least likely to attempt tobacco cessation (Alexander, Crawford, & Mendiondo, 2010). A study of blue collar apprentices found that smokers were 13 times more likely to have a partner who also smoked, but were also more likely to quit and maintain cessation for over 6 months if their partner requested they do so (Okechukwu et al., 2010). This finding suggests that tobacco cessation initiatives targeted at blue collar workers may benefit by including the worker's partner in the program (Okechukwu et al., 2010).

Another factor that may increase the likelihood of tobacco cessation is nicotine replacement therapy, but it is not used as often in low-income populations (Burgess et al., 2009). Providing nicotine replacement therapy to low-income residents in Minnesota (n=1,782) led to 11.4% of women and 19.2% of men abstaining from tobacco after eight months (Burgess et al., 2009). However, there was a significant interaction between gender and employment. Quit rates were higher among employed men (26%) compared to unemployed men (16%), whereas quit rates were lower among employed women (8%) compared to unemployed women (14%). Therefore, nicotine replacement therapy may be an effective component of tobacco use treatment, but more research on workplace or occupation factors for smoking among low-income women is needed (Burgess et al., 2009).

Reasons for smoking differ between employees of manual and non-manual occupations. A qualitative study by Katainen (2010) found that manual workers described smoking as compulsive, rooted in their daily routines, and not serving a specific purpose. They also viewed smoking as a "bad habit" and were less apt to rationalize or defend their behaviour beyond nicotine dependence. In contrast, non-manual workers described smoking as a functional and pleasurable behaviour that was associated with unforgettable experiences (e.g. sitting on a boat watching the sunrise). Non-manual workers saw their tobacco use as under their control to justify the behaviour. While manual workers described smoking as a social activity and noted responding to cues of colleagues' smoking, non-manual workers focused on individuality. A caution noted by the author is that manual workers may be less likely to justify their behaviour because they work in an environment where smoking is more common and they may not need to defend their behaviour or are not compelled to reflect on their smoking. However, the reasons presented for smoking may help guide tobacco cessation efforts within these populations.

Blue collar and service workers are also an important population to study due to their passive exposure to second-hand smoke in the workplace. Blue collar workers are exposed to increased levels of environmental hazards (e.g. carcinogens) in their work environment, meanwhile their worksites are less likely to have a workplace smoking policy (Alexander et al., 2010), possibly increasing the level of second-hand smoke exposure. A telephone survey of unionized workers in Minnesota found that 75% were concerned about second-hand smoke exposure and felt it was an important health and safety issue (Mitchell, Weisman, Jones, & Erickson, 2009). Similarly, service workers are often employed in settings, such as bars and casinos, which expose them to high amounts of second-hand smoke (Jensen et al., 2010).

### **3.2.2 Occupation and Workplace Characteristics Associated with Tobacco Use**

Studies indicate that there are occupation and workplace characteristics that may increase the likelihood of smoking, including: income, work schedule, physical demands, social culture, workplace smoking policies, and workplace cessation programs.

Service workers are among the lowest paid employees (Ham et al., 2011; Harris, Huang, Hannon, & Williams, 2011). Research suggests that low-income young adults (Harris et al., 2011) and low-income adults (Schwartz et al., 2010) are more likely to smoke than middle income workers. Lee (2008) suggests that low-income, minority smokers are price sensitive and more likely to quit as prices rise. Low-income workers also have increased rates of chronic diseases, thus workplace health promotion programs may help decrease unhealthy behaviours (e.g. tobacco use) and chronic disease (Harris et al., 2011). It is important to note that not all blue collar workers are low-income employees. However, smoking rates remain high among blue collar workers even after controlling for sociodemographics, such as age, education, and income (Bondy & Bercovitz, 2011; Ham et al., 2011). Therefore, income is a factor in tobacco use, but other workplace or occupational characteristics are also influential.

The work schedule of blue collar and service workers is another important factor. Artazcoz, Cortès, Escribà-Agüir, Cascant, and Villegas (2009) found that working inconsistent shifts increased the odds of working 50+ hours per week by over three times, compared to individuals with a consistent schedule. In addition, working more than 50 hours per week was associated with a 30% increase in odds of smoking in men, with a dose-response relationship between number of overtime hours and likelihood of smoking (Artazcoz et al., 2009). Women who worked more than 50 hours per week were more than twice as likely to smoke, compared to women who worked 30-40 hours per week. An interesting result was that working overtime was associated with many unhealthy conditions in men (i.e. smoking, shortage of sleep, lack of physical activity, hypertension, poor mental health, and job dissatisfaction), meanwhile it was only associated with smoking and inadequate sleep among women (Artazcoz et al., 2009). This result highlights the importance of considering gender in workplace interventions. In a sample of unionized truck drivers and dock workers (all males), heavier smokers were less likely to report getting adequate sleep and more likely to report experiencing job strain, compared to those who smoked fewer cigarettes per day (Sorensen, Quintiliani, Pereira, Yan, & Stoddard, 2009). Overall, the type of shifts, weekly hours worked, and job strain are important factors in tobacco use behaviour.

Blue collar and service occupations can be more physically demanding than other occupations. A study by Chau, Choquet, Falissard, and the Lorhandicap group (2009) suggests that jobs requiring the use of vibrating tools, working in adverse climates (e.g. bad weather), completing tasks at height, noise exposure, and working in a fast paced environments increased the odds of smoking. Adjusted for the number of years on the job, individuals with the most physically demanding occupations were more than twice as likely to smoke and more than three times as likely to initiate smoking during the current job. A limitation is that the individuals working on more physically demanding jobs are more likely to have colleagues who smoke, thus initiation may be due to the social environment and not the physical demands of the job. Chau and colleagues (2009) also reported that the heaviest smoking (greater than 20 cigarettes per day) was significantly associated with the most physically demanding jobs. Thus, workers with more physically demanding jobs may benefit from targeted tobacco cessation programs.

The workplace culture is a key factor in smoking among blue collar and service workers. As noted in the sections above, smoking rates are high among these occupations and, as an extension, having colleagues that smoke is more common (Ham et al., 2011). Also, manual workers are more likely to view smoking as a social activity (Katainen, 2010). Unionized truck

drivers and dock workers that perceived higher negative social consequences for tobacco use were 30% more likely to be in the preparation/action phase of quitting, compared to the precontemplation/contemplation stage. Similarly, workers that perceived higher co-worker norms to quit were 18% more likely to be in the preparation/action phase of quitting (Sorensen et al., 2009). Considering this evidence collectively, social culture in the workplace can act to both promote and discourage tobacco use.

Workplaces vary significantly in their policies on smoking. Smoking allowed in the work area is reported by 10% of white collar, 21% of blue collar, and 20% of service workers (Alexander et al., 2011). The lack of workplace policies limiting smoking is strongly associated with a higher probability of being a current daily smoker and the persistence of smoking (Ham et al., 2011). However, Azagba and Sharaf (2012) found that full workplace smoking bans are positively associated with perceived stress at work by male smokers and all younger adults (aged 18-40). No increase in perceived work-related stress was reported for non-smokers. Increased job dissatisfaction for hospitality workers was observed following a total smoke-ban for bars and restaurants in Norway, but only among smokers who had a negative perception of the ban prior to its implementation (Hetland, Hetland, Mykletun, Aaro, & Matthiesen, 2008). Also, there are unique challenges when implementing worksite bans in some situations, such as construction worksites, where it can be difficult to define outdoor spaces (Bondy & Bercovitz, 2011).

Workplaces also vary significantly in their provision of work-sponsored tobacco cessation programs. White collar workplaces are more likely to have a work-sponsored tobacco cessation program (20%), compared to blue collar (14%) and service (11%) workplaces (Alexander et al., 2011; Ham et al., 2011). The absence of a workplace cessation program is associated with higher probability of persistent smoking and a lower probability of intention to quit in the next six months among current daily smokers (Ham et al., 2011). A survey of unionized workers in Minnesota found that 85% felt the union should bargain for smoking cessation programs in the workplace, but very few (7%) felt that the union should be involved in leading the program (Mitchell et al., 2009). Overall, white-collar workers are more likely to have better resources and support in the workplace, as well as a greater cultural stigmatization of smoking, leading to a lower prevalence of smoking and increased rates of cessation (Ham et al., 2011).

### **3.3 Workplace Interventions**

Objective 2, Part B was to identify major workplace interventions that target smoking behaviours among blue collar and service workers. Similar to the findings in Section 3.2, there were no results that specifically targeted young adults. However, we identified two worksite tobacco use interventions focused on the individual (e.g. counselling) and three interventions focused on the workplace (e.g. smoking policies) that included young adults and targeted blue collar or service workplaces.

#### **3.3.1 Individual-Focused Interventions**

The first individual-focused intervention we identified is called MassBUILT, which was also introduced in the previous review (Filsinger & McGrath, 2008) but has more recently conducted a follow-up study (Okechukwu et al., 2009). This tobacco cessation intervention is an extension of the California Building Trades Unions Ignite Less Tobacco (BUILT) program, which was developed based on the social contextual model for health behaviour change (Okechukwu et al.,



2009). The social contextual model suggests that behaviour changes are more likely to succeed when mediating and/or moderating factors, such as occupational health and safety conditions in the work environment, are addressed by an intervention, in contrast to strictly focusing on the desired behaviour change (Okechukwu et al., 2009). Another study using this framework found that manufacturing workers participating in a tobacco cessation program with both health promotion and occupational health protection components were twice as likely to quit smoking compared to workers that were provided with only the health promotion component (Sorensen et al., 2002). Therefore, using the social contextual model as a theoretical framework for worksite interventions may improve its effectiveness.

The MassBUILT study sample included 1,817 apprentices (mean age of 28.4 years) from 10 worksites in Massachusetts and was conducted in collaboration with the Massachusetts Building Trades Council, which represents multiple unions. The council runs apprenticeship programs for many unionized blue collar careers, such as bricklayers, electricians, ironworkers, and plumbers. Based on the BUILT study materials, the US Public Health Service guidelines for tobacco use and dependence treatment, and the health promotion-health protection model, the multi-faceted MassBUILT intervention included: 1) a toxics and tobacco curriculum (two 1-hour modules completed during regular apprentice classes at the union hall); 2) group-based tobacco use counselling (eight weekly group sessions at each intervention site, led by tobacco treatment specialists); 3) free nicotine replacement therapy; 4) a do-it-yourself kit with cessation guide, available to all apprentices (supplemented those who did not attend the group sessions); 5) environmental cues for smoking cessation (posters in the union classroom and written materials). All of the intervention activities occurred over a span of four months.

The main study found significant benefits in tobacco cessation, with a quit rate of 19.4% among intervention participants and significant increases in intention to quit, self-efficacy to quit, and fewer days smoked, despite low participation in the intervention activities (Barbeau et al., 2006). However, a follow-up study found that the observed improvements were not maintained long-term (Okechukwu et al., 2009). The difference in tobacco cessation rates between the intervention and control group decreased 1-month post-intervention and further decreased at 6 months post-intervention, such that there was no significant difference between the two groups after six months. Despite the lack of maintained cessation, intensity of smoking was still significantly lower as apprentices in the intervention group were three times more likely to have decreased their daily smoking by at least half a pack at six months post-intervention (Okechukwu et al., 2009). Reducing intensity in smoking may be a step towards cessation and it could indicate that long-term programs are needed for workplace tobacco cessation initiatives to be successful. This study supports the feasibility of tobacco cessation programs within apprentice training and worksites, however the rate of relapse also highlights the need for worksite programs that are long-term to support continued cessation (Okechukwu et al., 2009).

The second individual-focused intervention identified was the Gear Up for Health Study (Sorenson et al., 2009). Similar to MassBUILT, the social contextual model was used as a framework to identify social contextual factors that may influence the effectiveness of the health behaviour change intervention. The Gear Up for Health Study took into consideration moderating factors at the individual (e.g. adequate sleep), interpersonal (e.g. supervisory support), and organizational (e.g. work schedule) levels within the framework to enhance their intervention and increase the likelihood of its effectiveness.

The intervention was a tobacco cessation and weight management program aimed at unionized truck drivers and dock workers employed at eight truck terminals affiliated with the Motor Freight Carriers Association in Eastern US. A baseline survey was completed by 542 employees (all males), including questions on tobacco use, intentions to quit, reasons for or against tobacco use at work, job satisfaction, adequate sleep, supervisory support, co-worker norms, job strain, job exposures (e.g. hazards), and typical shifts worked. Respondents were then asked to participate in a telephone-delivered tobacco cessation and weight management counselling program, and 227 employees agreed to receive at least the first phone call (Sorensen et al., 2010). Participation in the program was significantly associated with concern for hazardous exposure in the work environment and intention to quit smoking (Sorensen et al., 2009).

The telephone-delivered health promotion program was based on an intervention previously tested and shown effective among construction workers (Sorensen et al., 2007). For the current study, focus groups were conducted to identify elements of the job related to tobacco use and weight management behaviours and a researcher shadowed three participants to observe behaviours and working conditions (Sorensen et al., 2010). Both positive experiences (e.g. autonomy) and negative experiences (e.g. hazardous environment, stress to meet deadlines) were identified and incorporated into the telephone counselling sessions. Over a four-month period, participants received up to five telephone calls from trained counsellors using motivational interviewing techniques to address tobacco cessation. The counsellors addressed issues such as goal setting, enhancing self-efficacy, and making behaviour changes work within their work and home lives. The program was supplemented with a series of 11 written materials mailed to participants on themes that emerged during the focus groups. Also, nicotine replacement therapy was provided to participants who were interested in quitting.

Six months after the telephone program was complete, all baseline participants (program and non-program) were asked to complete another survey. At that time point, baseline tobacco users that participated in the program were more likely to have quit (no tobacco use in previous 7 days) compared to tobacco users that did not participate in the telephone intervention (23% versus 9%; Sorensen et al., 2010). After controlling for work terminal and characteristics associated with participation in the intervention, the difference remained significant (24% versus 9% for participants and non-participants, respectively). The results suggest that tailored interventions addressing the specific work conditions of truck drivers can be very effective. Also, a telephone-delivered intervention can be used to target individuals whose jobs require frequent travel.

### **3.3.2 Workplace-level Interventions**

The most common form of workplace-level intervention is the implementation of a smoking policy. In recent years smoking bans have moved from workplace-specific initiatives to government mandated bans. In our review of the broad young adult literature, smoking bans in the Netherlands, Finland, and Minnesota emerged and their implications are presented below.

The Netherlands implemented their national smoking ban in two phases, with a workplace ban in 2004 and a hospitality industry ban in 2008 (Nagelhout, Willemsen, & de Vries, 2010). Using the Dutch Continuous Survey of Smoking Habits, Nagelhout and colleagues (2010) measured smoking prevalence, quit attempts, and successful cessation in the population (aged 15 and

older). While smoking prevalence decreased following the workplace ban (30% to 28%), no significant change was observed following the hospitality ban. Also, while there was no change in the trend of quit attempts and successful cessation from 2001 to 2008, they did observe a significant temporary increase in both behaviours in 2004 (timed with the workplace ban). The workplace ban had a larger effect on successful tobacco cessation among workers that were more educated. While bar visiting was not associated with quit attempts before the hospitality ban, bar visiting and quit attempts were significantly associated following the ban. Bar visitors were almost twice as likely to attempt quitting compared to non-bar visitors (25% versus 14%). Overall, the workplace ban had a greater impact on smoking prevalence in the population, while the hospitality ban only impacted quit attempts and not smoking prevalence.

When Finland enacted their national smoke-free workplace legislation in 1995, workplaces were given the option of being entirely smoke-free indoors or having a room built specifically as a designated smoking area (Heloma, Helakorpi, Honkonen, Danielsson, & Uutela, 2011). Workplace compliance with the ban improved as non-compliance with the ban decreased from 19% in 1996 to 8% in 2008. Heloma and colleagues (2011) reviewed the prevalence of second-hand smoke exposure from 1985 to 2008 using a nationally representative survey. Across this time period, second-hand smoke exposure decreased from 48% to 10% among men and 28% to 4% among women. The greatest decrease in exposure was observed when the ban was implemented in 1995. From 1995 to 2008, the number of workplaces that elected to have a designated smoking room remained steady at approximately 48%. This study found that employees from workplaces with designated smoke rooms had twice the exposure to second-hand smoke as those working in workplaces with no indoor smoking allowed. Therefore, the authors conclude that no smoking should be allowed in workplaces, not even in designated rooms.

In 2007, Minnesota extended their state-wide workplace smoking ban to include hospitality venues (e.g. bars, restaurants, and bowling alleys). Jensen and colleagues (2010) evaluated the impact of this ban on second-hand smoke exposure among non-smoking hospitality workers (mean age = 29.6). Participants had not used tobacco for six months prior to testing, lived in a smoke-free household, were exposed to second-hand smoke in their workplace, and worked shifts that were longer than 6 hours. Urine was collected both two weeks before the ban was implemented and 4-8 weeks after, and was analysed for NNAL and cotinine – metabolites that are biomarkers for second-hand smoke exposure. The results indicate that 79% of non-smoking employees had at least a 50% reduction in NNAL and 54% had at least a 50% reduction in cotinine, indicating significantly less exposure to second-hand smoke. Thus, the hospitality smoking ban was effective in reducing exposure to non-smoking workers.

## 4 Conclusions

Current trends in smoking prevalence indicate that young adults have the highest rates of smoking and should be a priority group (Health Canada, 2011). The recent literature suggests that there are many articles on the predictors of smoking among university and college students, as well as the general population, but very little research on those who go straight into work or are unemployed (Freedman et al., 2012). The literature points to new trends in tobacco use, such as waterpipe smoking (Akl et al., 2011), and suggests that comprehensive approaches to tobacco

cessation may be needed. Also, there are new approaches to tobacco cessation program delivery using mobile phones, which appear promising for short term improvements but the long term effectiveness needs more research (Whittaker et al., 2009).

Blue collar and service workers were identified as a priority population having the highest rates of smoking across all occupations. Very little research was available on young adults in these occupations, so the general characteristics of these workers were provided. Specifically, blue collar and service workers were heavier smokers, more likely to be persistent smokers, and less likely to quit successfully (Ham et al., 2011), compared to white collar workers. The reasons for smoking differed significantly between manual and non-manual workers, and manual workers were more likely to view smoking as a negative habit (Katainen, 2010). Finally, blue collar and service workers are exposed to more environmental hazards (Alexander et al., 2010), such as carcinogens and fumes, and the prevalence of second-hand smoke exposure, especially in open air worksites, needs to be researched (Mitchell et al., 2009).

Beyond the individual traits of blue collar and service workers, characteristics of the occupational demands and workplaces are associated with an increased likelihood of smoking. These characteristics include: low income, variable work schedules, physically demanding jobs, social culture that accepts smoking, lack of workplace smoking policies, and lack of workplace cessation programs. Studies suggest that addressing these workplace factors may reduce the prevalence of smoking in blue collar and service workers (Alexander et al., 2011; Artazcoz et al., 2009; Chau et al., 2009; Ham et al., 2011; Harris et al., 2011; Sorensen et al., 2009). Therefore, workplace interventions present in our broad literature search on young adult smoking were reviewed.

Of the five workplace interventions identified, none of them explicitly focused on young adults. Two of them did represent a younger demographic on average (mean ages = 28.4 and 29.6), but they included all ages in their analysis. As such, all five interventions for the general blue collar and service employees were included. Two of the interventions targeted the individual employee and three of the interventions were larger smoking bans that covered the workplace.

The individual-focused interventions were based on the same theoretical framework, the social contextual model and both provided counselling, print materials, and nicotine replacement therapy. The first intervention targeted apprentices and also included a classroom curriculum component. While there was an increased likelihood of quitting following the intervention, the results were not maintained long term (six months; Okechukwu et al., 2009). The second individual intervention was aimed at unionized truck drivers and dock workers and provided the counselling sessions via telephone, accommodating the frequent travel required in this occupation. This intervention was very successful in decreasing the rate of smoking cessation and the results were maintained at the six month follow-up (Sorenson et al., 2009). One reason for success may have been the extensive focus groups and on-the-job observation conducted to develop the counselling materials. This study suggests that tailored programs may be very effective in blue collar populations.

The three studies describing smoking bans in different regions found that workplace and hospitality bans have different but beneficial effects. Workplace bans can increase the likelihood of quitting smoking (Nagelhout et al., 2010), reduce the prevalence of smoking (Nagelhout et al.,

2010), and reduce exposure to second-hand smoke (Heloma et al., 2011). Hospitality bans were less effective reducing the prevalence of smoking, but did impact quit rates among bar visitors (Nagelhout et al., 2010). Also, hospitality bans reduced exposure to second-hand smoke among non-smoking workers (Jensen et al., 2010). In all cases, smoke-free policies in the workplace improved tobacco-related health outcomes. Worksite smoking policies are effective, but they can also be a challenge to implement in open air environments, such as restaurant patios and construction sites.

#### **4.1 Implications for research:**

- Future research is needed to further examine the populations with high rates of smoking (i.e. young adults and blue collar and service workers) and determine the characteristics, smoking predictors, and quit behaviour of this population.
- There is a dearth of studies examining how these high risk populations overlap and, in particular, interventions targeting young adults in blue collar and service positions.
- Worksites for some blue collar and service workers include open air spaces and further research is needed to determine the exposure to second-hand smoke in these environments and the impact of interventions that ban smoking in these areas.
- New trends in interventions among young adults include the use of mobile technology and more research is needed to determine if this method of program delivery and messaging is as effective for subpopulations of young adults (e.g. service workers) and effective in the long-term

#### **4.2 Implications for policy/practice:**

- Early intervention is needed to target health behaviours as they are often initiated before the age of 18 (Oesterle et al., 2011).
- Interventions should be tailored to the target population and the settings in which they work, especially for different groups of blue collar workers.
- Workplace and hospitality smoking bans can be effective for reducing smoking and reducing exposure to second-hand smoke.

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