

# Attitudes to smoke-free outdoor regulations in the USA and Canada: a review of 89 surveys

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Received 27 April 2015

Accepted 25 August 2015

## ABSTRACT

**Objective** To review the published survey data on public support for smoke-free outdoor regulations in the USA and Canada (two countries at the forefront of such policies).

**Data sources and study selection** We searched for English language articles and reports using Medline, Google Scholar and Google for the period to December 2014. We retained population-based surveys of the adult general population in jurisdictions in the USA and Canada, with a minimum survey sample of 500.

**Data extraction** The analysis focused on assessing levels and trends in public support for different types of places and also explored how support varied between population groups.

**Results** Relevant data were found from 89 cross-sectional surveys between 1993 and 2014. Support for smoke-free regulations in outdoor places tended to be highest for smoke-free school grounds (range: 57–95%) playgrounds (89–91%), and building entrances (45–89%) and lowest for smoke-free outdoor workplaces (12–46%) and sidewalks (31–49%). Support was lower among smokers, though for some types of places there was majority smoker support (eg, school grounds with at least 77% support in US state surveys after 2004). Trend data involving the same questions and the same surveyed populations suggested increased general public and smoker support for smoke-free regulations over time (eg, from 67% to 78% during 2002–2008 for smoke-free school grounds in the USA). Higher support was typically seen from women and some ethnic groups (eg, African-Americans).

**Conclusions** Outdoor smoke-free regulations can achieve majority public support, including from smokers.

## INTRODUCTION

Since 2000 there has been a rapid growth in outdoor smoke-free regulations in many high-income countries, including in the USA and Canada.<sup>1–2</sup> These regulations most often apply to recreational areas (eg, parks and playgrounds), areas where people are close together (eg, stadia, transit stops, patios at hospitality venues) and educational campuses, and have begun to extend to some pedestrian shopping areas and, more rarely, whole urban areas.<sup>3–5</sup>

Previously, we reviewed the survey evidence for public attitudes to such policies (regulatory and other) worldwide that was available up to September 2008, and found 10 surveys from USA and Canada.<sup>6</sup> Two were national surveys of the USA from 2000 and 2001, and eight were state or provincial surveys; from Minnesota (1998 and 2004), California (2002, 2005, 2006) and Saskatchewan, New Brunswick and Manitoba

(2006). The Californian surveys indicated increases in support for smoke-free restaurant outdoor patios from 63% to 72% between 2002 and 2006, and for smoke-free building entrances from 63% to 67% between 2002 and 2005.<sup>7–9</sup>

Internationally, the extent of outdoor smoke-free regulations has expanded since 2008, and public attitudes may also have continued to change. To test this idea, we conducted a further review of population-based surveys of public attitudes in the USA and Canada towards smoke-free policies for outdoor places. These countries were selected because of the extent of the survey material available and because they appear to be at the frontier internationally for outdoor smoke-free regulations.

## METHODS

We conducted a ‘state of the art’ review, aiming for a comprehensive search of the available survey reports but with no systematic quality assessment.<sup>10</sup> Searches were made in Medline, Google Scholar, and Google for the period to December 2014, using the search terms: smoke, smoking or smoke-free; outdoor, park, playground, grounds, beach, sport, doorway, entrance, alfresco, or patio; law, ban or restriction; support or attitude. No date start filters were used for the searches. Google was used to search for each US state, and each Canadian province and territory, along with the words: smoking, attitudes and survey (with and without the words: outdoor, park or grounds). Each US state was searched for with the phrase ‘adult tobacco survey’. We adopted the definitions of the term ‘outdoor’ used by study authors and assumed that patios and building entrances are substantially or wholly outdoors. The specific terms used in studies (eg, ‘White’), were also used when reporting results for ethnic groups. Our inclusion criteria were as follows: population-based surveys of the adult general population (ie, not subpopulations such as youth or smokers) in US and Canadian jurisdictions, with a minimum survey sample of 500, reported in English language publications available online (articles, reports and other grey literature from government or health sector organisations). The sample size was selected to ensure a level of precision for estimated support (ie, a 95% CI for estimates of support of  $\pm$  up to 5%). For each relevant publication found, data were extracted on the jurisdiction(s), survey year(s), survey design and support for policies.

We examined the data for information on levels and trends in public support for different types of outdoor place and also for variations in support among population groups. For those place types where data were available from at least 20 surveys,

**To cite:** Thomson G, Wilson N, Collins D, et al. *Tob Control* Published Online First: [please include Day Month Year] doi:10.1136/tobaccocontrol-2015-052426

## Review

we calculated median support for all years, and for four time periods (though we specifically avoided calculating means given the heterogeneity of survey design and populations surveyed). For repeated surveys we assessed statistical significance where this was not previously calculated, and to illustrate examples of survey result uncertainty we also calculated 95% CIs from the reported data (using OpenEpi V.3). Data from the most repeated survey were graphed (using parks as an example) with a trend line added. We also made comparisons with the only previous review on this topic.<sup>6</sup>

## RESULTS

We found 59 relevant articles and reports from the USA and Canada, with data from 89 cross-sectional surveys conducted between 1993 and 2014 (for details of the surveys see Thomson 2015<sup>11</sup>). The surveys had from 1 to 16 relevant questions. Of these surveys, 78 were conducted in the USA and 11 in Canada. More specifically, survey data were available for 26 US states—as well as three US counties or groups of counties, and New York City (NYC)—and six Canadian provinces. Nine surveys were conducted before 2000, 47 during 2000–2007 and 34 during 2008–2014. Five states (Massachusetts, Arizona, California, Iowa, North Dakota) and the USA had four or more relevant surveys, but no Canadian province had more than three. One subpopulation survey (of parents) was included, because of the closeness of the sampled group to the general population.

While the number of reports found was considerably higher than in 2008,<sup>6</sup> coverage remains limited, with data available for only 52% of US states and 60% of Canadian provinces. Moreover, for 16 of the 32 state and provincial jurisdictions with data, there was only one survey (see [figure 1](#)). Of the 26 US states with data, for 10 the only relevant data concerned smoke-free school grounds. All the surveys appeared to be funded by government or health sector agencies.

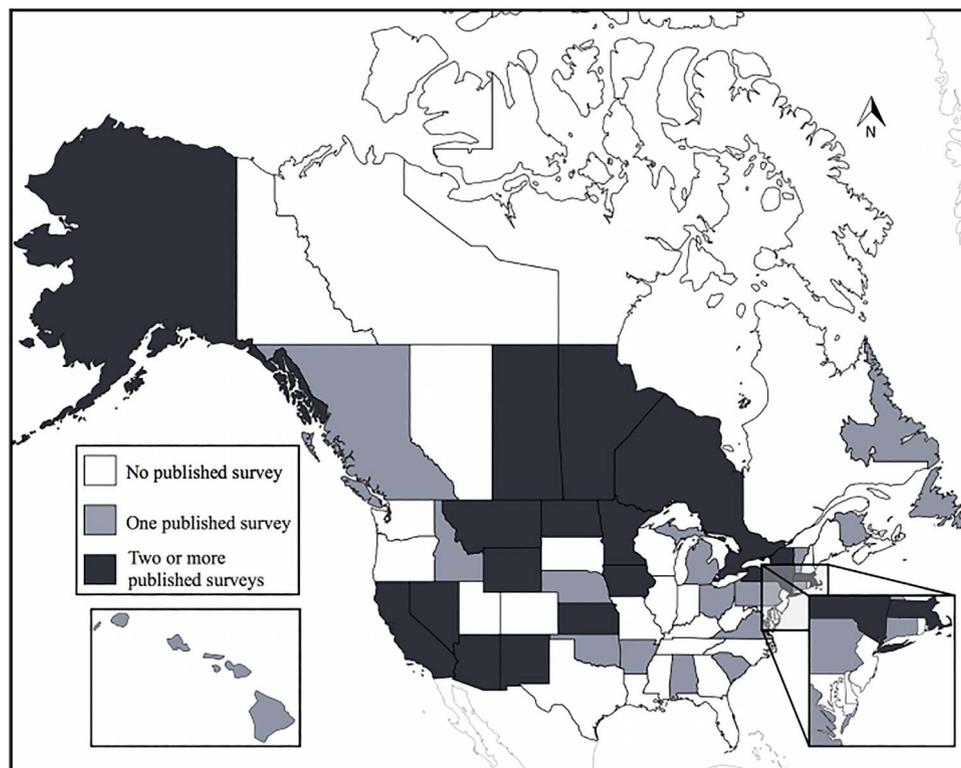
Sixteen reports (with 26 surveys) were found that were published before 2008 but not included in our previous review, likely because some were not available online before September 2008. One report,<sup>12</sup> was found in a more detailed form.<sup>13</sup> Some aspects of the 2002 data in one letter,<sup>14</sup> were supplemented by 2005 and 2008 data from the same survey series in a later report.<sup>15</sup> All but three of the studies found (Klein *et al* 2007; Ipsos Reid (Canada) 2011, Canadian Cancer Society 2014) used telephone surveys (generally random digit dialing).<sup>16–18</sup> Only a minority of the relevant studies found reported in detail on the survey and analysis methods used.

In contrast to the earlier review there was a greater availability of trend data in the USA and Canada. In 2008, such data were only found for attitudes in California towards smoke-free regulations for building entrances and restaurant patios. In this search, repeated survey data were found for 15 other jurisdictions (see ‘Changes in public support’ section below). However, for Canada only one jurisdiction (Ontario) had trend data.<sup>19 20</sup>

Five main patterns were identified in the data set: (A) variation in public support by type of outdoor place, (B) change in public support over time, (C) different levels of support from smokers and non-smokers, (D) different levels of support by gender and (E) the effect of the survey design.

#### Varied support for smoke-free outdoor regulations by type of place

The level of support varied by type of smoke-free outdoor setting ([tables 1 and 2](#)). It was generally over 75% (median 89%) for smoke-free school grounds and playgrounds, and always over 50% (median 67%) for building entrances and recreational areas. However, it was generally less than 50% (median 39%) for parks, and consistently less than 50% for smoke-free sidewalks.



**Figure 1** State and provincial jurisdictions in the USA and Canada for which published survey data were found. Map by Matthew Dance.

**Table 1** Support for smoke-free regulations by type of outdoor place and over time\*

Type of place (number of surveys)	Median % support (range %)				
	All years	1993–1999	2000–2004	2005–2009	2010–2013
School grounds and events (39)	89 (57–95)	72 (72)	88 (57–95)	89 (77–94)	85 (76–94)
Building entrances (29)	67 (45–89)	No surveys	63 (54–67)	69 (45–80)	67 (55–89)
Parks (20)	39 (25–61)	No surveys	32 (25–38)	39 (35–55)	44 (34–61)
Outdoor events (21)	31 (19–77)	20 (16–39)	24 (21–27)	40 (30–62)	56 (29–77)

\*Where there is a minimum of 20 surveys during 1993–2013 about regulations for a type of place. Note that the medians are for disparate jurisdictions, from federal to county level and for diverse survey methodologies (with differences in questionnaire wording being particularly important—see Discussion section). Given these issues, the median values should be treated as only relatively simplistic indicators of likely changes over time, and the results in [table 3](#) using the same survey instrument may be more valid.

### School grounds, outdoor school events, and playgrounds

In the 39 surveys with questions about smoke-free school grounds and events in 20 jurisdictions (USA nationally, 18 states, 1 county)<sup>21 22 27–51</sup> between 1998 and 2013–2014, support ranged from 57% (USA nationally in 2000)<sup>27</sup> to 95% (New Mexico in 2003).<sup>28</sup> Of the state and county surveys found, none after 1998 indicated under 84% support. In four surveys that contained questions asking *only* about smoke-free playgrounds and sportsfields, support was similar at 89% (Ontario in 2011)<sup>18</sup> and 91% in California (2002),<sup>14</sup> Saskatchewan (2013)<sup>17</sup> and Ontario (2012).<sup>20</sup>

### Building entrances

For smoke-free public entryway/entrance/doorway regulations, all but 1 of 30 surveys in 17 jurisdictions during 2001–2013 (USA nationally, six states, six provinces, NYC, two counties and a county group) indicated support of 54% or higher.<sup>13–15 20 23 24 26 33–35 45 46 52–60</sup> Support ranged from 45% (Onondaga County, NY in 2006)<sup>54</sup> to 89% (Ontario in 2012).<sup>20</sup> The USA national surveys since 2005 have indicated support of 61% or over.<sup>33 46 57</sup>

### Parks

Survey questions that mentioned parks were worded in varied ways, and often included references to other types of places. For 20 surveys in eight jurisdictions during 2000–2014, the question was *only* about parks and green spaces. In these, support for smoke-free policies ranged from 25% to 39% in the USA during 2000–2009,<sup>57 61</sup> 34% to 51% for Wyoming, Alabama, Nebraska, Virginia and Iowa during 2009–2014,<sup>21 22 48–51 62</sup> through to 48–53% in NYC (2010–2012)<sup>58 59</sup> 55% in California in 2008,<sup>56</sup> and 61% in Manitoba in 2013.<sup>25</sup>

### Sports and recreational areas

There were over 30 surveys with questions that mentioned recreational areas in general (eg, about ‘outdoor public places

such as parks, beaches, golf courses, zoos or sports stadiums’).<sup>14</sup>

Six asked *only* about support for smoke-free non-beach, non-park recreational areas, such as ‘outdoor recreation areas and athletic playing grounds’ (New Brunswick 2006)<sup>13</sup> and ‘near outdoor recreation facilities, such as sports fields’ (Ontario 2012).<sup>20</sup> In these, support was between 59% (NYC 2010—for ‘recreational areas, such as basketball courts and baseball fields’)<sup>17</sup> and 81% (Saskatchewan 2013—for sports fields).<sup>17</sup>

### Restaurant/bar patios

In the surveys with questions about smoke-free outdoor areas at hospitality venues,<sup>7 8 14 15 17–20 25 26 34 52 56</sup> support for smoke-free restaurant/café patios ranged from 41% (Clark County, Nevada (NV) in 2001)<sup>34</sup> to 82% (Ontario 2011).<sup>18</sup> Support for questions that included restaurant/café and bar patios ranged from 56% (California 2008)<sup>56</sup> to 70% (Saskatchewan 2013).<sup>17</sup>

### Events

The survey questions about outdoor events included such varied types such as ‘fair, music festival, concert, or auto show’, ‘concerts, festivals or parades’, ‘concerts and sporting events’, and ‘rodeos and race tracks’. There were 21 surveys in 10 jurisdictions during 1993–2013.<sup>17 20 23 25 45 54 56 63 64</sup> The support for smoke-free regulations ranged from 16% (Massachusetts in 1996)<sup>64</sup> and 27% (Arizona in 2002),<sup>63</sup> through to 77% (Saskatchewan in 2013).<sup>17</sup> Five of the six surveys from 2008 or later reported support of 54% (Minnesota in 2010)<sup>26</sup> or more—59% in Manitoba (2013),<sup>25</sup> 62% in California (2008),<sup>56</sup> 66% in Ontario (2012)<sup>20</sup> and 77% in Saskatchewan (2013).<sup>17</sup> A Nevada survey in 2008 reported 44% support.<sup>45</sup>

### Beaches

Nine surveys in five jurisdictions,<sup>8 25 46 55–59</sup> during 2006–2013 included a question that *only* mentioned beaches. The support for smoke-free policies ranged from 41% (USA in 2008)<sup>65</sup> and

**Table 2** Uncertainty associated with different sizes of surveys around levels of support for outdoor smoke-free regulations (illustrated with 2010–2013 surveys)

Type of place (number of surveys)	Median % support (range %)		
	2010–2013	Result (95% CI)* for smallest survey	Result (95% CI)* for largest survey
School grounds and events (n=7)	85 (76–94)	85% (83% to 87%) <sup>21</sup>	86% (85% to 87%) <sup>22</sup>
Building entrances (n=8)	67 (55–89)	62% (59% to 65%) <sup>23</sup>	74% (73% to 75%) <sup>24</sup>
Parks (n=5)	44 (34–61)	61% (58% to 64%) <sup>25</sup>	57% (56% to 58%) <sup>24</sup>
Outdoor events (n=6)	56 (29–77)	77% (73% to 80%) <sup>17</sup>	54% (53% to 55%) <sup>26</sup>

\*These 95% CIs were calculated for this article using raw data in the reports (see Methods section).

**Table 3** Analyses of trends in support in repeated surveys in the three largest populations surveyed

Jurisdiction	Place/s	Period	Question	Change	Source
USA	Parks	2000–2005*	Should outdoor parks be smoke-free?	25.0 to 38.8% (p<0.001)	McMillian <i>et al</i> <sup>33</sup>
USA	School grounds	2002–2005	Faculty and staff should not be allowed to smoke on school grounds	56.8 to 64.8% (p<0.001)	McMillian <i>et al</i> <sup>33</sup>
New York State	Various (beaches, parks)	2005–2011	Would you be in favour of a law banning smoking in outdoor public places, such as beaches or parks?	53.9 to 60.0% (p<0.001)†	RTI International <sup>53</sup>
California	Various	2002–2008	Smoking should be not allowed in outdoor public places such as parks, beaches, golf courses, zoos or sports stadiums?	28 to 33% (p<0.0001)†	Al-Delaimy <i>et al</i> <sup>15</sup>
California	Restaurant patios	2002–2008	Smoking should be not allowed in outdoor restaurant dining patios?	36.8 to 44.3% (p<0.0001)†	Al-Delaimy <i>et al</i> <sup>15</sup>
California	Building entrances	2002–2008	Smoking should be not allowed just outside entrances to buildings?	44.5 to 54.2% (p<0.0001)†	Al-Delaimy <i>et al</i> <sup>15</sup>

\*Statistically significant changes also occurred in 2000–2002,<sup>27</sup> 2001–2002,<sup>27</sup> 2002–2003,<sup>31</sup> 2003–2004,<sup>32</sup> and 2004–2005.<sup>33</sup> Later reports in this series, in 2008 and 2009, did not report on statistical analyses of changes.

†These p values were calculated for this article using raw data in the reports (see Methods section).

44% (Hawaii in 2006–2007)<sup>55</sup> through to 50–56% (NYC in 2010–2012)<sup>58 59</sup> and 65% (Manitoba in 2013).<sup>25</sup>

#### Sidewalks and business areas

Ten surveys in five jurisdictions during 2005–2012 looked at attitudes to smoke-free sidewalks and business areas.<sup>19 20 26 33 46 56–59</sup> In the nine that asked about smoke-free sidewalks, support ranged from 31% (USA in 2005)<sup>33</sup> to 49% (Ontario in 2012).<sup>20</sup> In the one survey (in California in 2008) that asked about smoke-free downtown business zones, there was 49% support.<sup>56</sup>

#### Outdoor workplaces

Support for smoke-free outdoor workplaces in general (not specific types of locations) ranged from 12% to 25% in Wyoming,<sup>21 49 50</sup> Virginia,<sup>48</sup> and USA during 2010–2014,<sup>66</sup> 25–40% in North Dakota,<sup>67</sup> 40% in Canada (2006),<sup>68</sup> to 46% in California (2008).<sup>56</sup> High support was reported for the *right* to smoke-free workplaces (a different question): 94% (90% from smokers) in Newfoundland and Labrador, and 94% (92% from smokers) in British Columbia.<sup>52</sup>

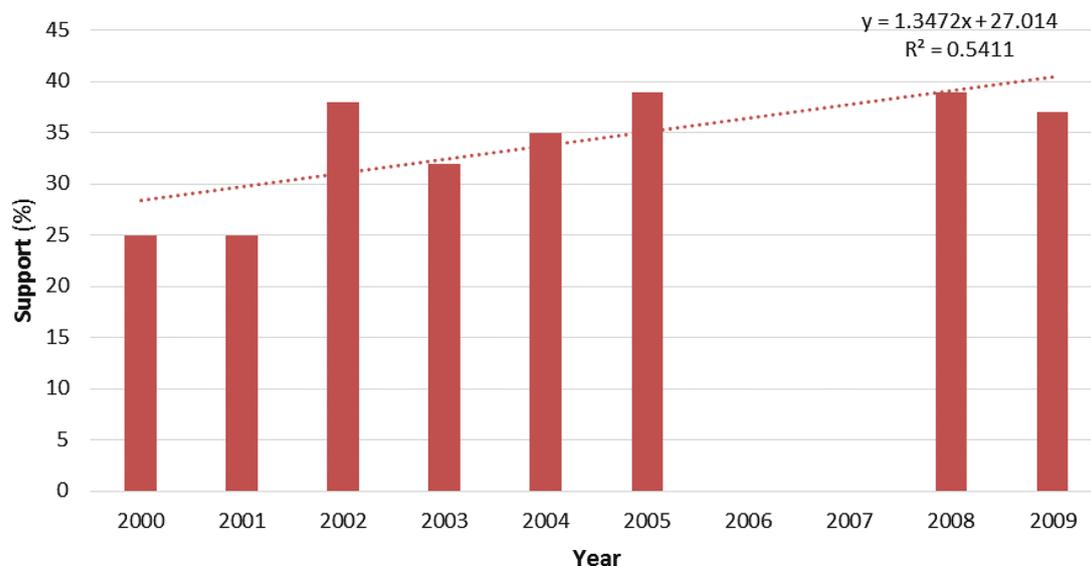
#### Other settings

Other types of places for which at least two surveys asked a question about smoke-free policy support included hospital grounds, with approval from 34% (USA in 2005) to 82% (Alaska in 2012);<sup>33 41 43 46 56</sup> college (university) campuses, with approval from 48% (NYC in 2012) to 65% (Nevada in 2008);<sup>45 56 58 59</sup> and transit sites, with approval from 56% (California in 2008) to 77% (Ontario in 2012).<sup>20 56</sup> One 2008 Californian survey also asked about the outside of shopping malls and about parking lots, finding 60% support for the former and 40% for the latter.<sup>56</sup>

#### Changes in public support over time

There was generally an increase in support for outdoor smoke-free regulations over time (see [table 1](#) and [figure 2](#)). Two of the greatest *proportionate* increases found were a 1.45-fold increase among the USA general population (from 25% to 37%, [figure 2](#)) and a 1.56-fold increase for USA smokers (from 9% to 14%) in levels of support for smoke-free parks during 2000–2009.<sup>27 31–33 46 57 61</sup>

Similarly, in the seven repeated surveys at a subnational level that gave responses about smoke-free parks (varied questions);



**Figure 2** Public support for smoke-free parks from a repeated national USA survey (with added trend line). For the survey question: 'In outdoor parks, do you think that smoking should be allowed in all areas, some areas, or not at all?'<sup>27 31–33 57 65 105</sup>

five indicated an increase in support; for California (52% to 60%)<sup>14 15</sup> for Nevada (from 45% to 53%)<sup>45</sup> New York State (from 54% to 60%)<sup>53</sup> for NYC from 48% to 53% (smokers from 30 to 33%)<sup>58 59</sup> and for Ontario from 55% to 58%.<sup>19 20</sup> For Iowa during 2002–2008 support decreased from 41% to 36%.<sup>36 37 39 40</sup> For Wyoming during 2010–2013/2014 support remained largely unchanged (33%, then 39%, then 34%).<sup>21 49 50</sup>

For the six repeated surveys that gave responses for smoke-free building entryways/entrances/doorways (varied questions), three out of six indicated an increase in support;<sup>15 33 54 57</sup> two indicated little change,<sup>34 35 58 59</sup> and one found an apparent decrease in support: for New York State during 2005–2011, from 77% to 70%.<sup>53</sup>

For smoke-free school grounds, support rose in the USA during 2002–2008 from 67% to 78%,<sup>27 31–33 46</sup> and in Iowa during 2002–2008 from 84% to 93%.<sup>36–40</sup> However, for the four other repeated surveys about smoke-free school grounds, there was little change over time in the already high level of support (85% or more) in Montana,<sup>28</sup> New Mexico,<sup>28</sup> Wyoming,<sup>21 49 50</sup> and Clark County, NV.<sup>34 35</sup>

For the two repeated surveys with questions only about smoke-free beaches, there was little change in levels of support over time (NYC at 52% to 50% during 2010–2012;<sup>58 59</sup> and USA at 41% to 43% during 2008–2009).<sup>46 57</sup>

In Ontario during 2011–2012, support for smoke-free sidewalks increased from 44% to 49%, and for smoke-free restaurant and bar patios from 57% to 61%.<sup>19 20</sup> In North Dakota support for smoke-free grounds of workplaces increased from 25% to 39% during 2006–2012.<sup>67</sup> Other repeated surveys showed little change: including those for smoke-free sidewalks in the USA and NYC.<sup>33 46 57–59</sup> outdoor events in Arizona, Massachusetts and Onondaga County, NY,<sup>54 63 64 69</sup> and playgrounds in Clark County, NV.<sup>34 35</sup>

The available reports and articles provided limited statistical analysis of the trends reported. Reports on statistically significant changes in support could be found for only six survey questions (table 3).

### Levels of support by smoking status

For most of the surveys where results by smoking status were given, smokers were reported as giving much lower support than non-smokers and the whole surveyed population (see table 4). The largest absolute difference found between smokers and non-smokers was for support for smoke-free parks in Alabama (15% vs 42%) in 2006.<sup>62</sup>

Exceptions to large smoker/non-smoker differences were found in response to questions about schools. Across 20 surveys with smoker/non-smoker data, differences in the support from

smokers and non-smokers for smoke-free school grounds and outdoor events ranged from 90% vs 95% in New Mexico in 2003,<sup>28</sup> to 41% vs 73% in the USA in 2004.<sup>32</sup> After 2004, the support from smokers for smoke-free school grounds in the 17 available state surveys was always 77% or more. Across the USA, smoker approval moved from 43% in 2005 to 60% in 2008.<sup>33 46</sup>

Differences between smokers and non-smokers tended to be higher in surveys reporting lower levels of non-smoker support. For the 23 survey questions across 13 jurisdictions (1993–2013) where survey responses from non-smokers were reported, and where non-smoker support for a policy was *under* 50%, the ratio of smoker to non-smoker support was nearly always 0.5 or less. In 16 cases (for regulations on restaurant/café patios, parks, sidewalks, events and recreation areas), the ratio was lower than 0.3.<sup>23 30 33 34 48 51 57 62 64</sup>

For the 39 survey questions (not about schools) where responses from non-smokers were reported, and where non-smoker support was *over* 50%, the ratio of smoker to non-smoker support was at least 0.4, except in one case (a Minnesota survey question about smoke-free parks at all times).<sup>16</sup> In 31 cases, the ratio was 0.5 or higher, and in five of these, it was 0.7 or higher: Clark County NV 2001 for ‘public places, like the zoo and playgrounds’;<sup>34</sup> Ontario for playgrounds in 2011;<sup>18</sup> Vermont for building entrances in 2012;<sup>60</sup> and NYC for recreational areas in 2011 and 2013.<sup>58 59</sup>

A number of surveys showed either high (majority) or very low (under 15%) smoker support for particular regulations. Besides the support for smoke-free school grounds, six surveys in four jurisdictions from 2004 onwards indicated over 50% smoker support for a policy: for building entrances (California—51% in 2005 and 54% in 2008;<sup>15</sup> Vermont—54% in 2012);<sup>60</sup> for outdoor areas used by children (51%) and for youth events (59%) in Minnesota in 2004,<sup>16</sup> and for places where children play (73% in Ontario in 2011).<sup>18</sup>

Low support for smoke-free outdoor places from smokers was reported by 16 surveys in eight jurisdictions during 1993–2011. Since 2008, this low smoker support at state or national level has been for outdoor workplaces in the USA (6% in 2009–2010)<sup>66</sup> and Virginia (5% in 2009–2010);<sup>48</sup> for sidewalks in the USA (8% in 2009);<sup>57</sup> for parks in the USA (14% in 2009) as well as Nebraska (9% in 2010–2011) and Virginia (11% in 2009/2010);<sup>31 48 51 57 61</sup> and for ‘outdoor public places, such as the park, zoos and playgrounds’ in Nevada (10% in 2008).<sup>45</sup>

An example of questions in the same survey indicating very different levels of smoker support is for Vermont (2012). Smoke-free building entrances were supported by 54% of smokers, but smoke-free ‘benches or parks’ by only 28%.<sup>60</sup>

### Support by gender

Men were less supportive of smoke-free outdoor regulations than women for *all* 51 results from 23 surveys where gender was reported. These surveys were for the USA 2000–2010,<sup>27 31–33 46 66</sup> Massachusetts 1993–2000,<sup>64</sup> California 2002–2005,<sup>7 70</sup> Minnesota 2004,<sup>16</sup> Alabama 2006,<sup>62</sup> Alaska 2006,<sup>44</sup> Hawai’i 2006–2007,<sup>55</sup> Virginia 2009/2010,<sup>48</sup> Ontario 2011,<sup>18</sup> and upper NY counties 2010–2013.<sup>23</sup> This difference was least for smoke-free building entrances in Hawai’i (2006–2007) with 72% support from men and 73% from women.<sup>55</sup> The female/male ratio in support was largest for smoke-free recreation areas in three New York State counties in 2012–2013 at 1.7 (50% vs 30%),<sup>23</sup> and for smoke-free outdoor workplaces in the USA in 2009–2010 at 1.6 (29% vs 18%).<sup>66</sup>

**Table 4** Smoker/non-smoker support for smoke-free regulations by type of outdoor place\*

Type of place (number of surveys)	Median % support (range %)	
	Smokers	Non-smokers
School grounds and outdoor events (25)	83 (41–90)	94 (71–96)
Building entrances (20)	43 (30–54)	72 (54–84)
Parks (15)	15 (9–54)	42 (30–58)
Outdoor events (10)	6 (5–22)	24 (18–49)

\*Where there was a minimum of 10 surveys during 1993–2013 about regulations for a type of place, with smoker/non-smoker data. Note the limitations with considering medians (as per the footnote in table 1 and the Discussion section).

### Differences by geography

The patterns of support in the available data indicated some geographic differences in support for smoke-free outdoor regulations. For the same or similar questions, support in Canadian jurisdictions was generally higher than the USA (outside of California). Within the data identified, support in California and Ontario was generally higher than in the rest of USA and Canada (see [Table 3](#) for California and the USA). There were some exceptions to this pattern: for example, support for smoke-free building entrances was 80% in a New York State survey in 2007,<sup>53</sup> compared to 72% and 77% in two Californian surveys in 2008.<sup>15 56</sup>

In 2009–2010, support for smoke-free outdoor workplaces was statistically significantly higher in the western census region of the USA (25.9%) compared to the south (22.3%) or mid-west (21.8%).<sup>66</sup> Support in the USA as a whole was generally lower than in the individual states where state-specific surveys were conducted. Exceptions included lower support in Virginia and Wyoming for smoke-free outdoor workplaces than across the USA.<sup>21 48–50 66</sup>

### Other differences—ethnicity, age, education and income

Support for smoke-free outdoor policies was generally lower from Caucasians compared to other ethnic groups, and from those aged less than 65 years, compared to those aged 65 plus. While a number of surveys indicated higher support for those with the least formal education, the pattern was not as clear as that for ethnicity and age. However, non-smokers with low formal education and low incomes who were exposed to secondhand smoke in the workplace were less supportive than those *not* exposed.<sup>66</sup>

Results by ethnicity, age and educational background were provided in six surveys for the USA as a whole. In five of these surveys with data on support for smoke-free parks, from 2002 to 2008, support from African-Americans was consistently higher (42–52%) than that of White Americans (30–37%). Support during these years was generally higher among those aged 18–24 (36–45%) and 65 plus (36–46%) than support among those aged 25–44 (33–36%) and 45–64 (28–39%). In 2002 support was fairly similar across educational levels (36–38%), but by 2008, those without high school diplomas showed more support (48%) than those with high school diplomas or higher levels of educational qualifications (37–38%).<sup>27 31–33 46</sup>

In these five USA surveys, support for smoke-free school grounds was generally higher from African-Americans than Whites, and was consistently higher from those aged 65 plus compared to those younger. The pattern across educational levels was not as clear-cut as that for smoke-free parks support.<sup>27 31–33 46</sup>

Two of these five surveys conducted across the USA, in 2005 and 2008, had data on support for smoke-free hospital grounds, sidewalks and doorways. In these surveys African-American support was consistently higher than for Whites, by 11–21 absolute percentage points. In these two surveys, support for smoke-free hospital grounds and sidewalks among those aged 65 plus was higher compared to younger adults, but for smoke-free doorways this pattern did not hold. Support for smoke-free sidewalks was higher from those without high school diplomas, and for smoke-free doorways was higher from both those without high school diplomas and college graduates.<sup>33 46</sup>

In the sixth USA survey, in 2009/10, support for smoke-free outdoor workplaces ranged from 15% (American Indian and Alaskan Native) to 16% (Multiracial), 20% (White), 30%

(Black) 31% (Hispanic) and 33% (Asian).<sup>66</sup> Support from those aged 65 plus was higher (30%) than for those aged 18–24, 25–44 and 45–64 (20%, 23% and 24%, respectively). There was a general increase in support with increased formal educational achievement, from 15% for those with General Educational Development Certificate, to 31% for those with graduate degrees. Support was highest for those with the least income (under \$20 000, 27%), greatest income ( $\geq$  \$100 000, 26%), and unspecified income (28%), compared to others.

At state level, surveys in Massachusetts (1993–2000) and in Virginia in 2009/2010 indicated similar ethnic and educational support patterns (to USA in 2008) for smoke-free sports/concerts (Massachusetts) and smoke-free parks and outdoor workplaces (Virginia). However, support in general increased by age.<sup>48 64</sup> In Virginia support for outdoor smoke-free policies was highest for those with the lowest income (under \$30 000).<sup>48</sup>

A survey in Alabama in 2006 reported Black support for smoke-free parks of 41% and White support of 33%.<sup>62</sup> A 2002 survey in California showed a consistent pattern across six outdoor areas of highest support for smoke-free policies among Hispanics, decreasing through Asians and African-Americans, to Non-Hispanic Whites. It also indicated a markedly higher level of support for all six outdoor smoke-free regulations from those with less than 12 years of education, compared to those with 12 years or more.<sup>70</sup>

### The effect of the questionnaire design

The wording of survey questions appeared to influence the level of support reported. Surveys with questions that asked respondents to indicate support for a range of options (eg, no restrictions, partial restriction, fully smoke-free) found lower levels of support for completely smoke-free outdoor areas than did surveys which asked participants if they supported completely smoke-free outdoor areas with a yes/no option. For example, in a survey of Newfoundland and Labrador, the statement ‘people who do not smoke should have the right to a smoke-free environment in any workplace’ produced 94% agreement (90% from smokers), and the question ‘Do you support/oppose a smoking ban in decks/patios of bars and restaurants?’ produced 60% support for a ban (27% from smokers). In the same survey, a question ‘Which of the following statements comes closest to how you feel about smoking in bars and taverns? Smoking should: Not be in any section, Be on decks/patios, Be only in enclosed smoking sections, Be only in smoking sections, Be in all sections’ produced only 31% support for ‘Not be in any section’ (9% from smokers).<sup>52</sup>

In a 2013/14 Wyoming survey, the question ‘Should smoking at parks: Always be allowed; Be allowed only at some times or in some places; Never be allowed?’ produced 34% support for ‘Never be allowed’. In contrast, the question ‘Some cities and towns are considering laws that would make parks smoke free; that is eliminating all tobacco smoke from parks. Would you support such a law in your community?’ produced 51% support.<sup>50</sup>

### DISCUSSION

For this study, we found 79 more surveys from the USA and Canada than in the only previous review of international attitudes to smoke-free outdoor policies, which identified only 10 such surveys.<sup>6</sup> The additional survey data enabled us to report changes in attitudes over time, for smokers compared to non-smokers, and for a much wider range of outdoor location types.

We found new evidence of patterns of support by geography, gender, ethnicity, age, education and income.

Cross-sectional surveys of public attitudes towards outdoor smoke-free regulations are becoming more common in the USA and Canada, but only five states and no provinces had more than three relevant repeated surveys to allow analysis of trends over time. The surveys reviewed in this research reveal important changes in the social landscape around smoking outdoors. Collectively, they indicate particularly strong support for smoke-free school grounds and playgrounds, and at least majority support for smoke-free public building entrances and sports areas. Compared to the findings of our previous review, there was stronger evidence of higher support for smoke-free regulations in places frequented by children (eg, playgrounds, school grounds) and in places where people are closer together or where secondhand smoke can enter an enclosed area (eg, public building entrances).

Since 2005, across the USA there has been a minimum of 60% support from smokers for smoke-free school grounds. For the four state and provincial surveys that specifically included questions on smoke-free playgrounds and sports fields, the support from smokers was at least 89%. This supports the pattern found in our previous review, of greater support for smoke-free regulations in outdoor areas where children are a large proportion of the potentially exposed population.<sup>6</sup> It is consistent with emerging evidence about smoker and non-smoker concern with smoking examples and normality.<sup>71 72</sup> The greater support for smoke-free regulations in areas associated with sport and recreation, relative to support for smoke-free parks, may be related to the former areas being associated with children and youth.

There is some evidence that support for smoke-free regulations in outdoor places is increasing. This increase is consistent with other research indicating increases in voluntary smoke-free home rules,<sup>73</sup> with changing attitudes about a wide range of indoor places where smoking should not be allowed,<sup>33 74</sup> and with the consequent reductions in exposure to tobacco smoke pollution.<sup>75</sup> Canadian smoker surveys have shown a significant increase in support for smoke-free outdoor dining during 2007–2011, but not for outdoor areas of bars and pubs.<sup>76</sup> Gallup surveys across the USA, using the question ‘should smoking in public places be made totally illegal, or not’ have recorded increased support from 39% in 2001 to 56% in 2014.<sup>77</sup>

There are a number of drivers of attitude change, including the experience of new smoke-free regulations,<sup>78 79</sup> and the declining prevalence of smoking.<sup>80</sup> Bayer and Bachynski have argued that ‘public opinion was far more supportive of outdoor smoking bans in the states that had embarked on the most aggressive efforts to restrict outdoor smoking’.<sup>1</sup> The observed tendency for smoker support for outdoor regulations to be nearer to non-smoker attitudes, once the latter is over 50%, suggests a normalising effect as community norms influence smokers.

There appears to be some association between higher support for smoke-free regulations for places where people are often close together, such as building entrances, relative to places that are usually less densely populated, such as for parks, beaches and parking lots. However, support for smoke-free sidewalks was consistently below 50%, suggesting that, despite the potential for dense pedestrian populations, other factors are involved (eg, the sometimes transient nature of the exposure to secondhand smoke).

The higher support for outdoor smoking restrictions among women has also been found for indoor regulations across the

USA,<sup>81</sup> and in some US states,<sup>82 83</sup> and may be partly driven by greater concern with the effect of example to children.<sup>71</sup>

The higher support for outdoor regulations by African-Americans compared to Caucasian Americans, and for those aged 65 years and above, is consistent with both groups’ higher support across the USA for indoor regulations,<sup>81</sup> and for smoke-free vehicles.<sup>84</sup> We found no reports that explicitly analysed attitudes by socioeconomic status (SES), but proxies for SES such as education and income levels were found. The higher support by those at either end of the educational spectrum is also reflected in support in the USA for indoor regulations,<sup>81</sup> and for smoke-free vehicles.<sup>84</sup> The generally greater support by those with low formal education and low incomes does not appear to be explained by higher exposure to secondhand smoke.<sup>66</sup>

The jurisdictional differences in support found in this review echoed those between the USA and California for other smoke-free regulations.<sup>9</sup> Other research indicates that the likely causes of such differences can be complex, and can include state/provincial level attitudes to tobacco control in general.<sup>85 86</sup> An example of one of the factors likely to influence levels of support is the higher *awareness* in New York State of smoking in outdoor public places, and building entrances, compared to the rest of the USA.<sup>53</sup>

### Limitations and need for further research

There are a number of limits to the generalisability of the findings. This study is only about adult attitudes, so similar work could be done for child and youth attitudes. At the state/provincial level, the limited coverage of surveys reduces opportunities for identifying geographical patterns in levels of support. The study was restricted to reports and articles available in English, and this may have limited the Canadian findings (eg, in terms of any research from Quebec reported in French only). For Canada as a whole, the only general population published data found was for smoke-free outdoor workplaces support in 2006. However, the ‘Canadian Tobacco Use Monitoring Survey’ series asked a question that measured support for smoke-free outdoor workplaces until 2012,<sup>87</sup> and if results from this were published, trend data for Canada available to the public would be greatly increased.

At the US national level, published results for 2010–2012 could not be found for the valuable National Social Climate Survey. In addition, data could not be found for large geographic areas within the USA. Excluding questions about school grounds, survey data were available from only 16 (32%) of the 50 states. The available published evidence on state level support may be generally biased to those states where support is higher than for the USA in general (ie, jurisdictions that invest in surveys possibly also invest more in tobacco control).

Data on attitudes to outdoor smoke-free regulations for a number of state surveys appear to be unpublished. For instance the Washington State Behavioral Risk Factor Surveillance System surveys from at least 2003–2008 appear to have unpublished data on attitudes to smoke-free public outdoor areas.<sup>88</sup> The 2010 Arkansas Secondhand Smoke Survey had a question ‘At workplaces, do you think smoking outdoors should be....?’ but publication of the results could not be found.<sup>89</sup>

Outside of California, Minnesota and Canada, there is a lack of published survey research on attitudes to smoke-free regulations for restaurant/café and bar patios. Some US states and Canadian provinces have already introduced smoke-free regulations for these areas.<sup>90 91</sup> Further research on this topic is important, especially for hospitality venues where alcohol is

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served. This is because alcohol consumption encourages smoking among smokers, increases relapse among former smokers, and facilitates 'social smoking', which may lead to nicotine addiction.<sup>92–94</sup>

There is a lack of on-site intercept surveys. Such surveys have some advantages, in that participants are (by definition) users of the place in question, whereas random phone surveys include respondents who may never use particular areas. In addition, there are limitations in using random digit dialling telephone surveys, including selection bias issues from this method of sampling.<sup>95</sup>

Caution needs to be used in interpreting the survey data found. The contradiction between high (94%) acknowledgement of rights to smoke-free workplaces, and low (31%) support for totally smoke-free bars and taverns in Newfoundland and Labrador,<sup>52</sup> underlines the importance of question wording.

It should be noted that it is difficult to group some of the surveys in a meaningful way, due to the heterogeneity in both survey design (eg, different survey question wording), and the surveyed populations. This limits the ability to make aggregate comparisons of results over time—though fortunately this is more possible with repeated surveys (eg, [table 3](#)). It would help if future surveys did more to standardise questions asked and to distinguish between places (eg, public parks in general vs common in-park components such as children's playgrounds, sports fields and athletic areas). Further research could also explore the effect that differences in ethnicity across US states might have on geographical differences to attitudes on outdoor smoke-free policies, for example, do high Hispanic populations in states affect state level attitudes? The generally greater support by those with low formal education and low incomes could also be investigated, for instance, to see if a lack of exposure to smoke-free policies, lower/higher smoking rates, social disapproval of smoking, or receptiveness to information might be factors.

Some work has been done to estimate the effect of changes in policies on attitudes, for example, a Massachusetts survey to see the effect of town policies.<sup>96</sup> However, determining dose-response relationships would require data on intensification of the intervention effect (eg, graduated enhancements of policy/multiple policies in different settings, alongside enforcement of policies) and linking these with changes in attitudes. This might be possible for some of the repeated surveys but would require considerable detailed additional data to allow for such calibration.

Similarly, possible connections between levels of support for outdoor bans and the time elapsed since the adoption of indoor bans might be investigated. However, given the length of time involved for some types of indoor place, and the multiple levels at which indoor bans have been adopted (eg, municipal, county, state/provincial and federal) extensive data would be needed.

### Policy implications

Smoke-free outdoors policies are a major intervention to improve population health by reducing exposure to tobacco smoke and smoking, and to reduce environmental contamination from tobacco-related litter. The implications for policy-making from substantial and growing public support for outdoor smoke-free regulations include the greater political feasibility of enacting such regulations, the better chance of their effective implementation, and the contribution of the changed norms to reduced smoking prevalence. There is

increasing evidence that the visibility or unacceptability of smoking at a community level is associated with higher cessation and lower smoking rates,<sup>97–99</sup> and perceived acceptability is associated with the risk of smoking.<sup>30 100 101</sup> Smoke-free outdoor public areas to denormalise smoking are an emerging field of inquiry.<sup>102–104</sup>

### CONCLUSIONS

Outdoor smoke-free regulations can have majority support among adults, including from smokers. Higher support for smoke-free regulations may occur for places commonly used by children, and where people are closer together, such as building entrances, as compared to parks, beaches and parking lots. Large geographic gaps remain in the published data.

### What this paper adds

- ▶ A 2008 review of attitudes about outdoor smoke-free policies found 10 surveys from the USA and Canada.
- ▶ In a review of publications to 2014, we found 89 cross-sectional surveys conducted between 1993 and 2014 for USA and Canada.
- ▶ Public support for smoke-free regulations for outdoor places tended to be highest for smoke-free school grounds, playgrounds and building entrances, and lowest for smoke-free outdoor workplaces and sidewalks. We found new evidence of patterns of support by geography, gender, ethnicity, age, education and income.

**Acknowledgements** The authors thank Matthew Dance for the map in [figure 1](#) and thank Marcus Gurtner for his contributions to the data checking.

**Contributions** GT conceived and designed the review and collected the data. GT, NW, DC and RE analysed the data and wrote the paper.

**Funding** GT was supported by University of Otago *Research and Study Leave* funds.

**Competing interests** None declared.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data sharing statement** All the survey data used has been presented in table form online at <http://www.otago.ac.nz/wellington/otago089940.pdf> Thomson G. Data on public attitudes toward smoke-free outdoor laws in the USA and Canada. University of Otago. Wellington, NZ. 21 April 2015. Accessed 22 April 2015. <http://www.otago.ac.nz/wellington/otago089940.pdf>.

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*Tob Control* published online September 14, 2015

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