Sun Behaviour in Canadian Children: Results of the 2006 National Sun Survey

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ABSTRACT

Childhood sun exposure is a particularly important determinant of skin cancer, yet little data are available for children. This paper describes sun behaviour among Canadian children for the summer of 2006. As part of the Second National Sun Survey (NSS2), 1,437 parents reported on the time spent in the sun, and the frequency of sun protection behaviours and sunburning for one of their children aged 1 to 12 years. Analysis was carried out using complex survey procedures in SAS and STATA. The majority of children (94%) spend at least 30 minutes in the sun on a typical summer day; however, regular sun protection is only commonly reported for young children (1 to 5 years) and involves covering their heads and wearing sunscreen (85%). The frequency of other protective behaviours is much lower, and sun protection decreases with age. Older children are also twice as likely to spend extended time in the sun and to get a sunburn. Among older children, boys are more likely to cover their heads and girls are more likely to wear sunscreen. Regular sun protection among Canadian children is low, given their sun exposure. Heavy reliance on sunscreen is consistent with previous reports and indicates that other measures, such as seeking shade and wearing protective clothing, need to be promoted. Riskier sun behaviour among older children may reflect decreased parental control, as well as changing attitudes and peer pressure, and highlights the importance of adult role models and targeted interventions for this age group.

Key words: Child behaviour; solar radiation exposure; skin neoplasms

La traduction du résumé se trouve à la fin de l'article.

Can J Public Health 2010;101(4):I14-I18.

Solar radiation is the primary cause of skin cancer,^{1,2} the most commonly diagnosed cancer among Canadians.³ Sun exposure during childhood is a particularly strong risk factor for this largely preventable disease and is thought to have a greater impact than adult sun exposure on increasing the risk of melanoma, the least common but most fatal form of skin cancer, as well as basal cell carcinoma, the most common form of skin cancer.⁴

Migration studies provide the best evidence supporting a strong association between childhood sun exposure and melanoma. These studies have shown that a younger age at migration from a region with low ambient solar radiation to a region with higher ambient solar radiation increases the risk of melanoma compared with an older age at migration.⁵ Childhood sun exposure has also been shown to increase the development of nevi, and nevi are a well-established risk factor for development of melanoma later in life.^{4,6} Case-control studies have reported an association between childhood sun exposure, especially sunburning, and melanoma, although study results are somewhat inconsistent.⁵ Findings are more consistent for basal cell carcinoma, with which sunburning and other measures of intense sun exposure in childhood have been shown to have a stronger association than similar exposures occurring in adulthood.⁴ For squamous cell carcinoma, both childhood and adult sun exposure are believed to be important risk factors.⁴

Given the importance of childhood sun exposure as a risk factor for skin cancer, as well as evidence showing that sun behaviours established early in life influence those adopted in adolescence and adulthood,⁷ skin cancer prevention strategies targeting children and parents are essential for reducing the skin cancer burden in Canada. Up-to-date knowledge of sun behaviours practised by children is needed to inform the development of such strategies.

The Second National Sun Survey (NSS2) is the largest study with comprehensive data on skin cancer risk behaviours, including sun exposure and protection behaviours, among Canadians. It involved a large sample of parents reporting on the sun behaviours of one of their children for the summer of 2006. The first National Sun Survey (NSS1) found that children of all ages had high levels of sun exposure; older children in particular (those aged 6-12) both spent a lot of time in the sun and practised poor sun protection.⁸ The NSS2 provides updated information that can be used to identify priorities and develop risk reduction strategies. This paper uses these data to describe recent typical daily sun exposure, sun protection behaviours and sunburning among Canadian children aged 1 to 12 years.

METHODS

Second National Sun Survey (NSS2)

The NSS2 was conducted across Canada's provinces between August and November 2006. A total of 7,121 adults aged 16 years and over participated (response rate 63%), 1,437 of whom reported on the sun behaviour of one child aged 1 to 12 years living in his/her household.

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Acknowledgements: The Second National Sun Survey was supported primarily by funds from the Canadian Cancer Society with supplemental funding from the Public Health Agency of Canada, the Canadian Partnership Against Cancer, and Cancer Care Ontario. It was conducted under the auspices of the National Skin Cancer Prevention Committee, Canadian Partnership Against Cancer.

Conflict of Interest: None to declare.

Table 1. Sun Exposure, Sun Protection and Sunburning, by Age

Sun Behaviour Variables	1-5 Years (n=542)		6-9 Years (n=445)		10-12 Years (n=449)	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
Time in the sun						
<60 min	31	(26.1-36.5)	12	(8.2-15.1)	13	(9.0-16.4)
1-2 hours	37	(31.2-41.8)	26	(20.9-31.3)	23	(18.3-28.7)
2-3 hours	22	(16.8-26.2)	28	(22.6-33.8)	30	(24.2-35.3)
≥3 hours	11	(7.4-13.9)	34	(28.1-40.0)	34	(28.6-39.6)
Always/often practising sun protection						
Spending <30 minutes in the sun*	11†	(7.1-14.2)	3†	(1.3-5.3)	3†	(1.4-5.5)
Seeking shade/avoiding sun	50	(43.7-55.4)	35	(29.0-41.0)	28	(22.9-33.8)
Covering his/her head	84	(80.1-88.8)	60	(53.5-65.8)	48	(41.7-53.7)
Wearing protective clothing	53	(47.6-59.1)	35	(29.4-40.9)	34	(27.9-39.5)
Using sunscreen SPF 15+ on face and body	86	(81.8-89.3)	66	(60.3-72.5)	54	(47.7-59.7)
Wearing sunglasses	18	(13.2-22.0)	15	(10.5-18.9)	15	(10.3-18.7)
Sunburn						
Getting 1 or more summer sunburns	10†	(6.4-13.2)	13	(9.3-16.9)	27	(21.5-32.3)

* Denominator for "spending <30 minutes in sun" includes all children; denominator for all other sun protection behaviours includes only children spending at least 30 minutes in sun.

† Figures should be interpreted with caution: $N \geq 10$ but coefficient of variation 16.6%-33.3%.
CI = confidence interval.

In households with more than one child, parents reported on the child with the next upcoming birthday. One parent refused to provide the sex of the child, yielding a final sample of 1,436 children, composed of 679 boys and 757 girls. Additional details regarding NSS2 sampling, data collection and analytic methods are described elsewhere.⁹

Survey questions

Sun exposure was assessed by asking "[Since June/during June, July, or August], how much time each day, on average, was your child in the sun between 11 am and 4 pm?" Response categories were as follows: less than 30 minutes, 30-60 minutes, 1-2 hours, 2-3 hours, 3-4 hours and 4 or more hours. Sun protection questions were asked only of respondents whose children spent at least 30 minutes in the sun on a typical day and were worded as "[Since June/during June, July or August], when [he/she] was in the sun for 30 minutes or more between 11 a.m. and 4 p.m. how often did he/she..." for each of the following behaviours: *seek shade and avoid direct sun; cover his/her head; wear clothing to protect his/her skin from sun such as a long sleeve shirt, long pants or a t-shirt; wear sunglasses; use sunscreen on his/her face; and use sunscreen on his/her body.* Response categories were Always, Often, Sometimes, Rarely, Never. For children who always, often or sometimes wore sunscreen either on their face or body, parents were asked what sun protection factor (SPF) the child usually used. Sunburning was assessed for the months of June, July and August and was defined as "reddening or discomfort of his/her skin that lasted longer than 12 hours after their exposure to the sun".

Analysis

Proportions and 95% confidence intervals (CIs), as well as tests of association using the adjusted Wald method, were generated using complex survey procedures in SAS 9.1 (SAS Institute, Cary, NC) and STATA 10.0 (StataCorp., College Station, TX) with weights adjusted for the probability of child selection and post-stratified to the regional, age and sex distribution of Canadian children.⁹ For regional comparisons, proportions were age-standardized according to the distribution of children aged 1 to 5 years, 6 to 9 years and 10 to 12 years in the 2001 Canadian population.¹⁰

RESULTS

As shown in Table 1, one third of children aged 1 to 5 years spend two or more hours in the sun during peak hours on a typical sum-

mer day and almost twice as many older children spend that amount of time in the sun. Only 3% of children aged 6 to 12 years and 11% of younger children spend less than 30 minutes in the sun on a typical day (95% CI 1.3-5.3 and 7.1-14.2, respectively). Among those typically spending at least 30 minutes in the sun, younger children are more likely to practise sun protection behaviours, with the exception of wearing sunglasses, which is infrequent in all age groups at 15%-18%. The incidence of summer sunburn increases with age, at 10% among children aged 1 to 5 years (CI 6.4-13.2) to 27% among children aged 10 to 12 years (CI 21.5-32.3).

As shown in Figure 1, sun behaviours vary somewhat by sex, especially among older children. There are no statistically significant differences between boys and girls overall for time spent in the sun, although older boys (aged 10-12 years) are slightly more likely to spend two or more hours in the sun than older girls (68% vs. 59%, $p=0.107$). Boys aged 6 to 12 years are more likely to cover their heads than girls of the same age (62% versus 45%, $p<0.001$), and girls aged 10 to 12 years are more likely to use sunscreen than boys of the same age (63% versus 46%, $p=0.007$). Boys are also more likely to wear protective clothes than girls for all ages combined (45% versus 36%, $p=0.007$), although within age groups this difference is apparent only among the youngest and oldest children.

Among children who at least sometimes wear sunscreen, less than 1% use an SPF less than 15, 6% use SPF 15, 42% use SPF 30, and 52% use an SPF greater than 30. Using an SPF greater than 30 is more common among children aged 1 to 5 years than those aged 6 to 12 years (65% versus 44%, $p<0.001$).

DISCUSSION

This study shows that a high proportion of Canadian children, especially older children, spend extended time in the summer sun. Those aged 6 to 12 years are the most likely (64%) of any age group examined in the NSS2 to spend two or more hours in the sun on a typical summer day, followed by 40% of adults aged 16 to 24 years, 33% of children aged 1 to 5 years and 25% of adults aged 25 years or older (13- to 15-year-olds not included in NSS2).¹¹ These findings are unlike those of recent reports that children are now spending the same amount of time in the sun as adults and that adolescents spend the least amount of time in the sun.¹² Comparisons of adult and child sun behaviours must be interpreted carefully because, while the former were self-reported, the latter were provided by proxies (parents/guardians).

Figure 1. Sun behaviours, by age and sex

a) Spending two or more hours in the sun

b) Seeking shade/avoiding sun

c) Wearing protective clothing

d) Covering head

e) Sunscreen SPF 15+ on face and body

f) Sunburning

* Figures should be interpreted with caution: $N \geq 10$ but coefficient of variation 16.6% - 33.3%.

Most children (94%) typically spend at least 30 minutes in the sun each day, indicating that virtually all Canadian children should be regularly using sun protection throughout the summer months. Regular sun protection was commonly reported at 85% among young children (1 to 5 years) and involves covering their head and wearing sunscreen, whereas wearing protective clothing and seeking shade/avoiding the sun are only regularly practised by about half of all young children. These sun protection behaviours are much less commonly practised by older children. Regularly wearing sunglasses was uncommon, at about 15% of children of all ages.

The incidence of summer sunburn lasting for longer than 12 hours was relatively low, at 10%, among young children but more than doubled to 27% among children aged 10 to 12 years.

This is the first large-scale Canadian study of child sun behaviour since the NSS1 was carried out in 1996. Overall sun exposure and sun protection behaviours reported in 2006 are comparable with those reported in 1996, with the exception of considerably fewer children regularly wearing protective clothing in 2006 and children generally using sunscreen with a higher SPF in 2006. Comparisons with previously published NSS1 results are limited because

parents reported on their children aged 12 years or less collectively in the NSS1, whereas in the NSS2 one child aged 1 to 12 years was randomly selected as the interview subject.⁸ By restricting the NSS1 data to parents with only children aged 1 to 5 years and to parents with only children aged 6 to 12 years, we found that 70% of parents with the younger children reported regular use of protective clothing compared with 53% of children of the same age in 2006; among parents with only children aged 6-12 years, 50% reported this behaviour in 1996 compared with 34% of this age in 2006 (NSS1, unpublished). Sunburn appears to have been more commonly reported in 1996 than 2006; however, sunburn questions were significantly different between the two surveys.

Sun exposure during childhood, especially intense exposure causing sunburn, is a particularly strong risk factor for skin cancer and is largely preventable by following good sun protection practices. Since the mid-1990s, sunscreen has been the most commonly practised form of sun protection among Canadian children,⁸ and this is consistent with reports in other countries.¹³⁻¹⁶ Although sunscreen is an important component of good sun protection, with evidence indicating that when used properly it reduces the risk of sunburn and development of nevi during childhood,¹⁷ most adults and children do not adequately apply sunscreen and should not rely on this as a sole means of protecting against the sun.¹⁸⁻²⁰ Other measures, such as seeking shade during peak sun hours and wearing protective clothing, need to be promoted, especially among children.

Sun protection behaviours among children are highly influenced by parental sun behaviours,^{21,22} and sun protection education programs aimed at parents and caregivers, as well as community-wide programs, have been shown to improve sun-safe behaviours among children.²³ As children get older, however, they spend less time under the direct supervision of their parents and begin to take more responsibility for their own behaviours. Furthermore, barriers to sun protection, such as positive attitudes towards tanning and peer-group influence, become more pervasive between the ages of 8 and 15 years.²⁴ As a result, as shown in the present study, extended time in the sun increases and regular sun protection decreases among older children.

Preferences for different types of sun protection between boys and girls also appear to develop at this age. The findings that boys are more likely to cover their head and girls are more likely wear sunscreen reflect the sun protection preferences by sex observed among teenagers and adults in Canada and elsewhere.^{11,25} That these sex differences emerge in the present study at such a young age likely reflects pervasive social norms and the influence of older adults (e.g., parents, older siblings) on the behaviour of young Canadian children. Indeed, the riskier sun behaviour observed among older children highlights the need for positive role models and targeted interventions for this age group.^{7,24}

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RÉSUMÉ

L'exposition au soleil durant l'enfance est un déterminant particulièrement important du cancer de la peau, mais on dispose de peu de données sur les enfants. Nous décrivons ici les comportements au soleil des enfants canadiens pendant l'été 2006. Dans le cadre de la Deuxième Enquête nationale sur l'exposition au soleil (EES2), 1 437 parents ont fourni des données sur le temps d'exposition au soleil, la fréquence des comportements de protection solaire et les coups de soleil pour un de leurs enfants âgé de 1 à 12 ans. Nous avons analysé ces données au moyen de méthodes d'enquête complexes avec les logiciels SAS et Stata. La grande majorité des enfants (94 %) passent au moins 30 minutes au soleil par une journée d'été typique; cependant, la protection solaire systématique ne semble concerner que les jeunes enfants (1 à 5 ans); elle consiste à se couvrir leur tête et à appliquer un écran solaire (85 %). La fréquence des autres comportements de protection est beaucoup plus faible, et l'utilisation d'une protection solaire diminue avec l'âge. Les enfants plus vieux sont aussi deux fois plus susceptibles de passer longtemps au soleil et de brûler. Chez les enfants plus vieux, les garçons sont plus susceptibles de se couvrir la tête, et les filles,

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d'appliquer un écran solaire. La protection solaire systématique chez les enfants canadiens est faible compte tenu de leur exposition au soleil. Le recours massif aux écrans solaires, également observé dans d'autres travaux de recherche, montre qu'il faut promouvoir les autres mesures, comme de rester à l'ombre et de porter des vêtements pour se protéger. La diminution des comportements de protection chez les enfants plus vieux pourrait s'expliquer par le moindre contrôle parental, les changements d'attitudes et la pression à l'uniformité, d'où l'importance d'avoir des modèles adultes à émuler et des interventions ciblées pour ce groupe d'âge.

Mots clés : comportement de l'enfant; exposition au rayonnement solaire; tumeurs de la peau