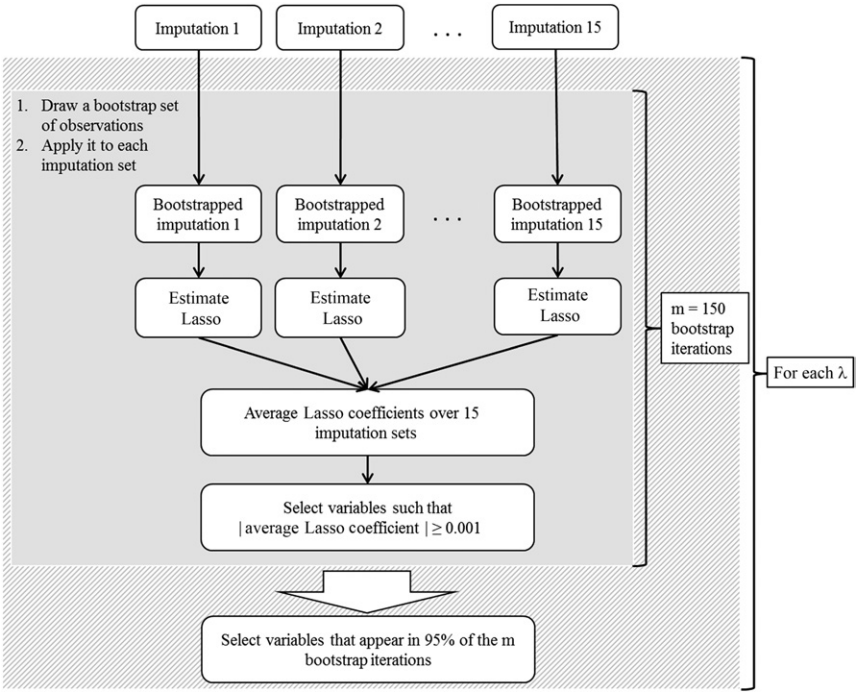
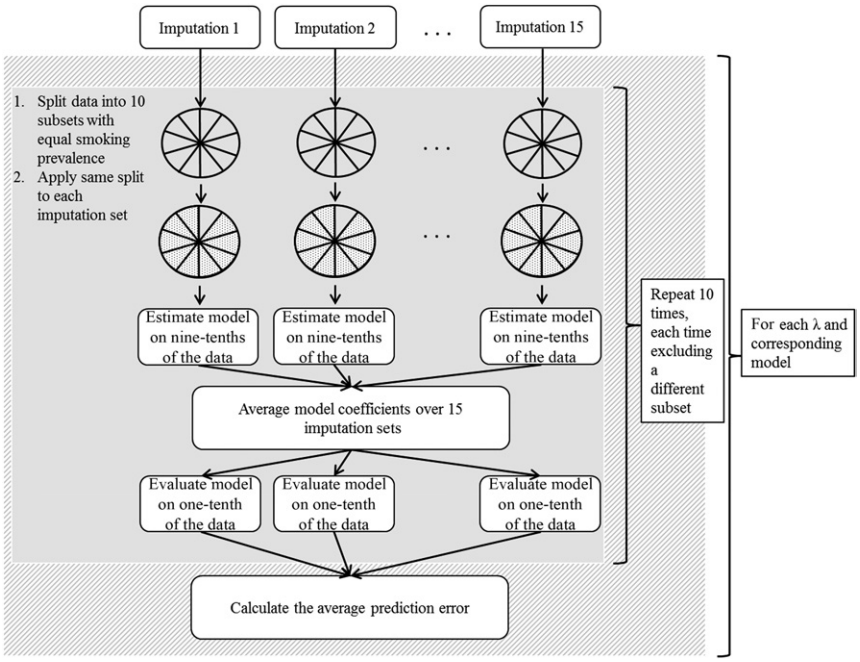
Supplemental Information



SUPPLEMENTAL FIGURE 4
Flowchart for variable selection in the training data set, NDIT study (1999–2005).



SUPPLEMENTAL FIGURE 5
Flowchart for estimating regression coefficients and model validation, NDIT study (1999–2005). The prediction error associated with a model was calculated by evaluating the model in the tenth of data not used to derive the model and was averaged over the 15 imputation data sets. The final coefficients and overall prediction error were calculated by using the entire training data set by averaging over the 10 partitions.

SUPPLEMENTAL TABLE 3 Description of All Candidate Variables (n = 58), NDIT Study (1999–2005)

	Data in Cycle(s)	Item(s)	Response Choices	Recoded
Dependent variables[23]				
Ever smoked cigarettes	1–20	Have you ever in your life smoked a cigarette, even just a puff (drag, hit, haul)?	No; yes, 1 or 2 times; yes, 3 or 4 times; yes, 5–10 times; yes, >10 times	—
Current smoking status[24]	1–20	Check the box that describes you best…	I have smoked cigarettes (even just a puff) but not at all in the past y; I smoked cigarettes once or a couple of times in the past y; I smoke cigarettes once or a couple of times each mo; I smoke cigarettes once or a couple of times each wk; I smoke cigarettes every d	—
No. cigarettes smoked per mo[25]	1–20	For each of the past 3 mo: during _____, on how many d did you smoke cigarettes, even just a puff?	0, 1, 2–3, 4–5, 6–10, 11–15, 16–20, 21–30, every d, do not know	No. cigarettes per mo computed as No. d in which the participant had smoked in the mo times the mean No. cigarettes smoked per d on the d in which he or she had smoked. Mean No. cigarettes per mo computed as the mean over 3 mo. Test–retest reliability of mean No. cigarettes per mo was adequate (intraclass correlation coefficient = 0.64).[55]
		On the d that you smoked during the last mo, how many cigarettes did you usually smoke each d?	<1, 1, 2–3,4–5, 6–10, 11–15, 16–20, 21–25, >25, do not know	Was recoded as 1 if mean No. cigarettes per mo >0 and 0 otherwise.
Variables considered in prognostic tool				
Sex	1–20	Are you a boy or a girl?	Male, female	—
Age, y	1–20	Date of birth, date of survey	—	—
University-educated mother	13, 17	How much education has your mother had?	Did not finish high school, high school graduate, vocational or technical school, CEGEP, completed university, other, do not know	No, yes (university-educated mother)
Single family	1–20	Do you live with your biological mother, biological father, stepmother, stepfather, aunt(s), uncle(s), grandmother(s), and/or grandfather(s)?	No, yes (for each person)	No, yes (single-parent family)
Parent(s) smoke	1–20	Does your mother or father currently smoke cigarettes?	No, yes (for each parent)	No, yes (1–2 parents smoke)
Sibling(s) smoke	1–20	You have ___sisters and/or ___brothers who smoke cigarettes	0, 1, 2, 3, 4, 5, 6+	No, yes (≥1 sibling smokes)
Friends smoke	1–20	How many of the people who you usually hang out with smoke cigarettes?	None, a few, about half, more than half, most or all	No (none), yes (a few, about half, more than half, most or all)
Alcohol use	1–20	During the past 3 mo, how often did you drink alcohol (beer, wine, hard liquor)?	Never, a bit to try, once or a couple of times a mo, once or a couple of times a wk, usually every d	No (never), yes

TABLE 3 Continued

	Data in Cycle(s)	Item(s)	Response Choices	Recoded
Participate in team sports	1–20	Since September of this school y, did you belong to any of the following intramural or extramural school sports teams (teams that were not part of your regular gym class)…? (list of 13 different teams). Now think about sports teams and lessons outside of school. In the past 3 mo, did you belong to a…? (list of 12 different teams)	No, yes (for each team or lesson)	No, yes (≥1 team)
Sedentary time[55,56]	1–20	On weekdays, I usually watch _____h of television a d; on weekends, I usually watch ____ h of television a d. How many h do you usually spend on a computer in a single d during your leisure time?	No. h television per wk computed by summing weekday h (after multiplying by 5) and weekend h (after multiplying by 2); No. h television and computer per wk = sum of television and computer use in h per d in the past wk	No, yes (screen time per wk ≥14 h as per recommendation of <2 h screen time per d)[57,58]
Met physical activity guidelines[59–62]	1–20	Think about the physical activities that you did last wk from Monday to Sunday outside your regular school gym class. For each activity that you did for 5 min or more at 1 time, mark an "X" to show the d on which you did that activity (list of 29 different activities).	No, yes; Monday to Sunday for each of 19 activities designated moderate (3–6 METs) and 9 activities designated vigorous (>6 METs)	No, yes (met guidelines if participant engaged in at least 1 moderate or vigorous activity 1 d in the last wk).
Easy not to smoke	1–20	When you see other kids your age smoking cigarettes, how easy is it for you not to smoke?	Very easy, quite easy, a bit difficult, very difficult	Recoded into "hard not to smoke" 0: very easy not to smoke; 1: quite easy, a bit difficult, very difficult not to smoke
Need a cigarette	1–20	How often have you felt like you really need a cigarette?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Cigarette accessibility	1–20	How easy is it for you to get cigarettes?	Very easy to get cigarettes, quite easy to get cigarettes, a bit difficult to get cigarettes, very difficult to get cigarettes, I do not know (I never tried to get cigarettes), I do not smoke	0: quite easy to get cigarettes, a bit difficult to get cigarettes, very difficult to get cigarettes, I do not know (I never tried to get cigarettes), I do not smoke; 1: very easy to get cigarettes
Depression symptom: tired[63–66]	1–20	During the past 3 mo, how often have you felt too tired to do things?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Depression symptom: sleep[63–66]	1–20	During the past 3 mo, how often have you had trouble going to sleep or staying asleep?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Depression symptom: unhappy[63–66]	1–20	During the past 3 mo, how often have you felt unhappy, sad, or depressed?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Depression symptom: hopeless[63–66]	1–20	During the past 3 mo, how often have you felt hopeless about the future?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Depression symptom: nervous[63–66]	1–20	During the past 3 mo, how often have you felt nervous or tense?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Depression symptom: worried[63–66]	1–20	During the past 3 mo, how often have you worried too much about things?	Never, rarely, sometimes, often	0: never; 1: rarely, sometimes, often
Worry and stress: divorce[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your parents separating or divorcing?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: loneliness[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: loneliness?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot

TABLE 3 Continued

	Data in Cycle(s)	Item(s)	Response Choices	Recoded
Worry and stress: love[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: breaking up with your boyfriend or girlfriend?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: father[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your relationship with your father?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: mother[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your relationship with your mother?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: siblings[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your relationship with your brother(s) and/or sister(s)?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: friends[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your relationship with your friends?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: health[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: a health problem (such as acne or asthma)?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: wt[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your wt?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: sex[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: sex?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: new family[67]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: your new family (parents remarried)?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: money[68]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: financial problems in your family?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Worry and stress: school[68]	1–20	During the past 3 mo, have you been worried or stressed by any of the following: school work?	Not at all or this does not apply to me, a little bit, quite a bit, a whole lot	0: not at all or this does not apply to me; 1: a little bit, quite a bit, a whole lot
Self-esteem: value[68]	12	I think I am someone who has something valuable to offer, at least as much as other people do	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: qualities[68]	12	I think I have a certain No. good qualities	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: failure[68]	12	Everything considered, I tend to think I am a failure	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: capable[68]	12	I think I am capable of doing things as well as other people my age	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: proud[68]	12	There is little reason to be proud of myself	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: attitude[68]	12	I have a positive attitude toward myself	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true

TABLE 3 Continued

	Data in Cycle(s)	Item(s)	Response Choices	Recoded
Self-esteem: accept[68]	12	I find it difficult to accept myself as I am	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: useless[68]	12	Sometimes I think I am really useless	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Self-esteem: good for nothing[68]	12	I have thought of myself as a good-for-nothing on occasion	Not at all true, a little true, very true	0: not at all true; 1: a little true, very true
Impulsivity: think[69,70]	14, 18	I often do things without stopping to think	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Impulsivity: impulsive[69,70]	14, 18	I am an impulsive person	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Impulsivity: talk[69,70]	14, 18	I often talk quickly, before thinking things out	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Impulsivity: involved[69,70]	14, 18	I often get involved in things I later wish I could get out of	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Impulsivity: self-control[69,70]	14, 18	I need to use a lot of self-control to keep out of trouble	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Impulsivity: trouble[69,70]	14, 18	I often get into trouble because I do things without thinking	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Impulsivity: exciting ideas[69,70]	14, 18	I get carried away by new and exciting ideas, but I do not think of the possible problems	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: thrills[69]	14, 18	I often try new things just for fun or thrills, even if most people think it is a waste of time	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: exciting[69]	14, 18	When nothing new is happening, I usually start looking for something that is exciting	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: believe[69]	14, 18	I can usually get people to believe me, even when what I am saying is not quite true	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: feel[69]	14, 18	I often do things based on how I feel at the moment	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: control[69]	14, 18	I sometimes get so excited that I lose control of myself	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: rules[69]	14, 18	I like it when people can do whatever they want, without strict rules and regulations	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true

TABLE 3 Continued

	Data in Cycle(s)	Item(s)	Response Choices	Recoded
Novelty-seeking: instincts[69]	14, 18	I often follow my instincts, without thinking through all the details	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: truth[69]	14, 18	I can do a good job of "stretching the truth" when I am talking to people	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true
Novelty-seeking: change interest[69]	14, 18	I change my interests a lot, because my attention often shifts to something else	Not at all true, a little true, somewhat true, pretty true, very true	0: not at all true; 1: a little true, somewhat true, pretty true, very true

CEGEP, collège d'enseignement général et professionnel; MET, metabolic equivalent of task; —, not applicable.

SUPPLEMENTAL TABLE 4 Performance Measures for Models With 1–20 Variables, in the Training and Validation Data Sets, NDIT Study (1999–2005)

No. Variables	Training Data Set			Test Data Set	
	C-Statistic From Cross-Validation, Mean (SD)	Optimism	Sensitivity–Specificity	C-Statistic	Sensitivity–Specificity
20	0.709 (0.062)	0.028	0.758–0.501	0.767	0.783–0.558
19	0.713 (0.064)	0.025	0.768–0.505	0.767	0.777–0.563
18	0.714 (0.064)	0.023	0.765–0.518	0.766	0.777–0.571
17	0.715 (0.064)	0.022	0.788–0.500	0.765	0.805–0.568
16	0.715 (0.068)	0.020	0.783–0.500	0.771	0.797–0578
15	0.717 (0.071)	0.018	0.783–0.495	0.769	0.797–0.561
14	0.718 (0.070)	0.016	0.789–0.496	0.770	0.811–0.535
13	0.719 (0.070)	0.014	0.789–0.499	0.768	0.811–0.548
12	0.721 (0.068)	0.011	0.798–0.500	0.768	0.797–0.550
11	0.716 (0.070)	0.010	0.794–0.463	0.775	0.797–0.531
10	0.712 (0.072)	0.011	0.793–0.471	0.775	0.824–0.536
9	0.710 (0.070)	0.010	0.787–0.462	0.764	0.811–0.523
8	0.701 (0.074)	0.009	0.782–0.464	0.746	0.811–0.520
7	0.700 (0.076)	0.008	0.784–0.452	0.751	0.811–0.522
6	0.702 (0.074)	0.005	0.795–0.455	0.749	0.824–0.509
5	0.691 (0.073)	0.005	0.792–0.450	0.753	0.784–0.522
4	0.689 (0.077)	0.004	0.792–0.450	0.749	0.770–0.527
3	0.661 (0.052)	0.004	0.797–0.389	0.746	0.865–0.422
2	0.638 (0.051)	0.003	0.803–0.383	0.710	0.865–0.372

SUPPLEMENTAL TABLE 5 Number of Missing Values for Each Variable, NDIT Study (1999–2005)

Characteristics	Missing Values
Male sex	0
Age, y	0
University-educated mother	239
Single-parent family	43
Parent(s) smoke	54
Sibling(s) smoke	25
Friend(s) smoke	44
Consumes alcohol	56
Participates in team sports	0
Feels the need for a cigarette	51
Hard not to smoke when others are smoking	54
Worry or stress about loneliness	81
Worry or stress about wt	67
Feels hopeless about the future	59
Worry or stress about relationship with siblings	72
Worry or stress about a health problem	71
Has something valuable to offer	196
Has a positive attitude toward oneself	198