

Factors Affecting Change Over Time in Self-reported Health

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ABSTRACT

Background: Self-reported health status has become a conventional measure of health status at the population level. Further, the literature supports its use as a valid indicator of morbidity and mortality. However, relatively little attention has been paid to how self-reported health status changes over time or the factors affecting change. This paper explores the factors affecting health status change over time using data from a neighbourhood health survey.

Methods: Two rounds (2001; 2003) of health survey data (n=671) were collected across 4 distinct neighbourhoods in Hamilton, Ontario. Logistic regression analysis is used to predict change in self-reported health status between the two time periods as well as determinants of change using a range of compositional, contextual and collective characteristics of individuals as potential explanatory variables.

Results: Results reveal that approximately one third of participants experienced a change in health status between the two survey years. Interestingly, the key factors affecting change in health status are compositional characteristics of individuals (e.g., smoking, health care use) as opposed to contextual (e.g., neighbourhood of residence) or collective (e.g., marital status). Contrary to published literature, the current study does not reveal any significant links between a change in health status and either gender or age.

Conclusion: These results inform our understanding of both the stability of health ratings over time and the determinants of health status change. Further research should be undertaken to enhance this understanding; in particular, studies with larger sample sizes, longer time frames and more sensitive indicators of composition, context and collective are needed.

MeSH terms: Health status; health determinants; change in health status, neighbourhoods

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

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Self-reported health status has become a conventional measure of health status at the population level. Measures of self-reported health have been used to examine the health-related impacts of lifestyle behaviours such as smoking and drinking,^{1,2} health care use,^{3,4} social status,⁵⁻⁸ but also as a determinant of health care use.^{9,10}

Often self-reported health is obtained by a single-item global measure in which an individual is asked to rate their health on a 4- or 5-point ordinal scale relative to others the same age. Barofsky et al.¹¹ demonstrate that use of such single global measures of self-reported health status yield equivalent interpretive outcomes to those obtained from multi-item self-assessments.^{12,13} The use of both single and multi-item measures is grounded in literature that demonstrates their validity as indicators of both morbidity and mortality.¹⁴⁻¹⁸ Research has shown strong associations between physician assessments of acute health and chronic conditions and measures of self-reported health status,¹⁹⁻²² as well as mortality.²³⁻²⁶

Despite the widespread use and demonstrated reliability of this health measure, little attention has been paid to how self-reported health status changes over time as well as the factors affecting these changes. With the exception of Kopp et al.²⁷ and Mustard et al.²⁸ the small body of research exploring change in self-reported health has mainly been conducted for elderly populations²⁹⁻³² or populations experiencing a life transition (e.g., menopausal women, retirees).³³⁻³⁶

In general, research has shown associations between a decline in self-reported health status over time and a decrease in functional capacity and physical activity.^{32-35,37-39} Use of health care services, episodes of hospitalization and an increase in chronic conditions are also linked with a decrease in self-reported health, as are depression and lack of social support.^{32,33,37,38,40,41} Furthermore, socio-demographic and economic characteristics such as income, age, and education are influential mediating factors in a change in self-reported health.^{29,33}

While the current field of study provides important insight into changing levels of health status and predictors of health status change for specific subpopulations, we know little about predictors of change in health status for the general population. One exception is a recent study by Mustard et al.²⁸ that examined the extent to which position in the occupational hierarchy was

predictive of a decline in self-reported health over a 48-month period. These authors found that the collective influence of health behaviours (e.g., BMI, smoking) and psychosocial work exposures (e.g., psychological distress) explained some of the decline in self-reported health.²⁸

Building upon the work of Mustard et al.,²⁸ we seek to investigate a range of compositional, contextual and collective factors (see Boardman et al., Cummings et al., Macintyre et al.)⁴²⁻⁴⁴ related to change (both improvement and decline) in self-reported health status. In addition to providing important insight about factors related to health status change for a general population, the research is focused at the neighbourhood level, a rarely examined but important unit of analysis in the current field of study.

DATA AND METHODS

Telephone surveys (2001; 2003) were administered in four neighbourhoods across Hamilton, Ontario. Neighbourhoods were defined using quantitative and qualitative approaches. Socio-economic and demographic data from the 1996 Census of Canada were extracted at the census tract level and Principal Component Analysis (PCA), local indicators of spatial association (LISA) and geographical information systems (GIS) were used to define neighbourhoods representing clusters of 17 socio-economic and demographic determinants of health (see Luginaah et al. for a more detailed explanation).⁴⁵ The objective was to identify neighbourhoods combining high/low income and high/low population and social diversity (e.g., lack or presence of new immigrants, visible minorities). Four such neighbourhoods were identified: Chedoke-Kirkendall (high income and high diversity), the Downtown Core (low income and high diversity), Northeast Industrial (low income and low diversity), and the Southwest Mountain (high income and low diversity). In-depth interviews with local decision-makers and key informants confirmed the neighbourhood boundaries.

The sampling frame, stratified across the four neighbourhoods, was developed using tax assessment records and the Canada 411 Internet locator service. An introductory letter was sent to all potential respondents, informing households about the study. Surveys were subsequently administered by

TABLE I
Characteristics of Respondents (n=671)

Factors	Categories	%
Composition		
Gender (n=671)	Female	55
Age (n=667)	18-24	9
	25-44	39
	45-64	37
	65+	15
Education (n=662)	Greater than high school	79
Income (n=666)	More than \$30,000	73
Employment (n=668)	Employed	67
GP use in past 2 weeks (n=647)	Yes	18
Unmet health care needs (n=671)	Yes	7
BMI (n=639)	Not Overweight	65
GHQ (n=671)	No Emotional Distress	90
Chronic conditions (n=645)	None	52
Satisfaction with health (n=661)	Satisfied/very satisfied	86
Smoking status (n=671)	Current smoker	28
Context		
Neighbourhood (n=671)	Chedoke-Kirkendall	28
	Downtown	21
	Northeast Industrial	24
	Mountain	27
Satisfaction with neighbourhood (n=668)	Satisfied/very satisfied	94
Housing tenure (n=664)	Own	83
Condition of dwelling (n=663)	Not in need of major repairs	82
Collective		
Marital Status (n=666)	Married	67
Number of close friends (n=671)	Above mean (8.5)	32
Number of close relatives (n=671)	Above mean (8.3)	34

the Institute for Social Research (ISR) at York University.

The first telephone survey (Nov 2001 to April 2002) was administered to a random sample of approximately 300 households in each neighbourhood. The response rate, defined as the number of completed interviews divided by the estimated number of eligible households multiplied by 100, was 60%. Surveys were completed by the adult (aged 18+) in the household who had the most recent birthday. The survey contained a range of questions designed to capture residents' perceptions of their neighbourhood, social and community networks, health status and behaviours, use of health care services, and demographic and socio-economic characteristics. The McMaster University Research Ethics Board approved the study.

The second survey (2003) was conducted with the same sample. 882 households were identified as eligible for the follow-up. Of the 281 ineligible households, i) 136 had moved out of the area/no such person at address; ii) 125 had not-in-service numbers; iii) in 20 cases, the household informant was unable to speak English/respondent was neither physically nor mentally well enough to complete the interview; and, iv) for 73 households, it was not possible to determine eligibility. Therefore, the overall response rate for eligible households was 76% (671 out of 882) or 56% of the

original sample. 655 respondents answered the question, in both surveys, "Compared to others your own age, how would you rate your own health?" Responses were given on a five-point scale (excellent, very good, good, fair, poor). Improvement/decline in health between the two surveys was defined as an increase or decrease of one point or more on the five-point scale, excluding a change from excellent to very good and vice versa.⁴⁶ Improvement in health status was categorized into a binary variable with '0' representing no improvement (i.e., decreased or stayed the same) and '1' representing any increase. Similarly, decline in health status was also a binary variable with '0' representing no decline (i.e., increased or stayed the same) and '1' representing any decrease.

Logistic regression analysis was used to explore the predictors (collected during the baseline survey) of improvement or decline in self-rated health status, employing a range of compositional, contextual and collective variables (see Table I for more information).⁴²⁻⁴⁴

Composition relates to the characteristics of individuals (age, sex, education (high school or not), household income (categorized following Statistics Canada's Low-Income Cut-Off of <\$30,000 versus ≥\$30,000⁴⁷), housing tenure (own vs. rent), employment (employed vs. unem-

TABLE II

Comparing Self-reported Health Status in Survey 1 and Survey 2

Health Status	Survey 1 (%) (n=1164)	Survey 2 (%) (n=658)
Excellent	22 (n=258)	27 (n=180)
Very good	36 (n=416)	38 (n=240)
Good	27 (n=310)	19 (n=127)
Fair	10 (n=116)	11 (n=70)
Poor	6 (n=64)	5 (n=32)

TABLE IV

Model Predicting an Improvement in Health Status

Variable (Ref)	Classification	Change in Health Status OR (95% CI)
Gender (female)	Male	0.67 (0.42, 1.09)
Age (18-24)	25-44	0.85 (0.30, 2.44)
	45-64	1.67 (0.57, 4.86)
	65+	1.41 (0.44, 4.53)
Marital status (married)	Single	0.78 (0.44, 1.38)
Household income (>\$30,000)	<\$30,000	1.06 (0.57, 1.99)
Education (> high school)	< High school	0.74 (0.40, 1.37)
Employment (employed)	Not employed	1.11 (0.62, 2.01)
Health care (no physician visit)	Visited physician	0.58 (0.26, 1.02)
Unmet health care needs (no)	Yes	0.61 (0.23, 1.62)
Smoking status (nonsmoker)	Smoker	1.87* (1.10, 3.14)
Chronic conditions (none)	1 or more	1.28 (0.75, 2.18)
GHQ (score <4)	≥4	1.21 (0.54, 2.69)
BMI (not overweight)	Overweight	2.25** (1.37, 3.69)
Health satisfaction (satisfied)	Dissatisfied	1.95* (1.04, 3.64)
Close friends (above mean 8.5)	Below 8.5	1.09 (0.65, 1.83)
Close relatives (above mean 8.5)	Below 8.5	1.15 (0.70, 1.90)
Neighbourhood of residence (Mountain)	Chedoke-Kirkendall	1.29 (0.69, 2.44)
	Downtown	1.23 (0.54, 2.78)
	Industrial	1.40 (0.72, 2.71)
Neighbourhood satisfaction (satisfied)	Dissatisfied	0.91 (0.32, 2.58)
Housing tenure (own)	Rent	0.81 (0.38, 1.75)
Condition of dwelling (not in need of repairs)	Needs major repairs	1.17 (0.63, 2.15)
Constant		0.09***
Goodness of fit	Sensitivity	61
	Specificity	65
	Rho-square	0.09

*p<0.05; **p<0.01; ***p<0.001

ployed), smoking status, body mass index (BMI) (derived from measures of height and weight (weight (kg)/height (m²)), this variable was dichotomized into a BMI of ≥25 (regarded as overweight) and <25⁴⁸), chronic health conditions (measured as one or more positive responses to a series of questions regarding physician-diagnosed long-term skin conditions, arthritis or rheumatism, asthma, high blood pressure or hypertension, diabetes, urinary tract problems, stomach ulcers, digestive problems and cancer), satisfaction with health (somewhat or very satisfied vs. somewhat or very dissatisfied) and psychosocial health (measured using the 20-item version of the General Health Questionnaire (GHQ), a validated measure of emotional well-being⁴⁹). In addition, utilization of health care was measured as a response to the question, "In the past two weeks, how many times have you seen or talked on the telephone with your family doctor about your physical, emotional or mental health?" (none vs. 1 or more consultations). The final compositional variable

measures self-perceived access to care, with respondents answering 'Yes' or 'No' to the question, "During the past 12 months, was there ever a time when you needed health care but did not receive it?"

Collective characteristics are related to social factors and include marital status (partnered vs. not), number of close friends (above vs. below the mean) and number of close relatives (above vs. below the mean).

Three variables were included to represent contextual characteristics of the living situation: neighbourhood of residence, neighbourhood satisfaction (a four-point scale ranging from very satisfied to very dissatisfied), and whether or not the respondent's dwelling was in need of major repairs. The following section reports results of descriptive analyses and the two regression models. Two separate logistic regression models were conducted to identify those variables significantly associated with an improvement in health status and a decline in health status. The data were weighted to take account of the probability of individuals being selected for interview

TABLE III

Health Status Change Between Survey 1 and Survey 2 (n=655)

Change in Health Status	%
Worsened	15
Stayed the same	67
Improved	18

in households of different sizes. All estimates are based on analyses of weighted data. In general, the baseline and follow-up samples are a similar match in terms of all compositional, collective and contextual variables with three exceptions. In the follow-up sample, a slightly higher percentage of respondents are married, did not receive health care when it was needed, and own their own homes. These differences are not statistically significant.

RESULTS

Fifty-five percent of participants are female; a majority are between 25 and 64 years of age and married (Table I). Almost 80% have completed high school or higher levels of education and approximately 70% have household incomes above the poverty line and are employed. Less than one quarter are daily smokers (similar to studies of the general population⁵⁰) and less than 50% have one or more chronic conditions; 65% are not overweight according to their BMI (a slightly lower rate than the general Canadian population⁵¹) and only 10% score 4 or more on the GHQ-20 questionnaire indicating a probable case of emotional distress.

In comparing self-reported health status across the two surveys (Table II), it is evident that while 'very good', 'fair' and 'poor' ratings remain stable, the percentage of respondents rating their health as 'good' declined and the percentage rating their health as 'excellent' increased. In fact, 33% of respondents reported a different level of health status at time two than had been reported at time one (Table III). Fifteen percent rated their health at a lower level, 18% at a higher level and for 67% of respondents, self-rated health remained the same (Table III).

The results of the logistic regression model predicting an improvement in health status are presented in Table IV, and the results predicting a decline in health status are presented in Table V. The independent variables represent the range of compositional, contextual, and collec-

tive characteristics of individuals outlined in Table I. All independent variables are categorical.

The results for the logistic regression model for an improvement in health status reveal the importance of compositional characteristics for predicting an improvement in health status. In particular, current smokers (OR 1.87; CI 1.10, 3.14), those who are overweight (OR 2.25; CI 1.37, 3.69), and those who were dissatisfied with their health (OR 1.95; CI 1.04, 3.64) at the time of the first survey are more likely to rank their health higher (i.e., an improvement) between the two time periods. In the model predicting a decline in health status, again only compositional factors were significant, revealing that those who visited their physician in the past two weeks are less likely to report a decline (OR 0.38; CI 0.16, 0.88) while those who rent their home (OR 2.47; CI 1.18, 5.17) are more likely to rate their health status at a lower level. No contextual or collective variables were statistically significantly related to either an increase or decrease in self-rated health.

DISCUSSION

The results of the study reveal that over one third of participants experienced a change in health status between the two survey years. Key determinants of change in health status (either an increase or decrease) are compositional characteristics of individuals that represent aspects of socio-economic status and lifestyle behaviours. In particular, the results reveal that smokers, those who are overweight and those who are dissatisfied with their health are more likely to rate their health higher in survey 2, perhaps suggesting that people in poor health have lower expectations.⁵² However, compositional measures were collected at baseline, thus participants may have experienced a change in lifestyle behaviours between the two time periods. Individuals who have used the services of a physician are less likely to experience a decline in self-rated health, suggesting the health-protective benefits of health care. The finding that housing tenure is associated with a change in health status is not surprising, given that research has shown dwelling characteristics are a more sensitive indicator of wealth than income in the Canadian context.⁵³ Unlike previous research, the current study

TABLE V
Model Predicting a Decline in Health Status

Variable (Ref)	Classification	Change in Health Status OR (95% CI)
Gender (female)	Male	1.24 (0.74, 2.09)
Age (18-24)	25-44	0.59 (0.23, 1.52)
	45-64	0.66 (0.25, 1.75)
	65+	0.33 (0.11, 1.04)
Marital status (married)	Single	0.91 (0.49, 1.68)
Household income (>\$30,000)	<\$30,000	1.25 (0.65, 2.41)
Education (> high school)	< High school	1.02 (0.53, 1.98)
Employment (employed)	Not employed	1.68 (0.91, 3.09)
Health care (no physician visit)	Visited physician	0.38* (0.16, 0.88)
Unmet health care needs (no)	Yes	1.32 (0.49, 3.51)
Smoking status (nonsmoker)	Smoker	1.22 (0.69, 2.16)
Chronic conditions (none)	1 or more	0.97 (0.54, 1.77)
GHQ (score <4)	≥4	1.29 (0.54, 3.08)
BMI (not overweight)	Overweight	1.05 (0.60, 1.84)
Health satisfaction (satisfied)	Dissatisfied	0.97 (0.44, 2.13)
Close friends (above mean 8.5)	Below 8.5	0.68 (0.40, 1.16)
Close relatives (above mean 8.5)	Below 8.5	1.02 (0.59, 1.76)
Neighbourhood of residence (Mountain)	Chedoke-Kirkendall	0.76 (0.38, 1.53)
	Downtown	0.74 (0.32, 1.71)
	Industrial	1.19 (0.59, 2.37)
Neighbourhood satisfaction (satisfied)	Dissatisfied	0.51 (0.13, 2.04)
Housing tenure (own)	Rent	2.47** (1.18, 5.17)
Condition of dwelling (not in need of repairs)	Needs major repairs	1.06 (0.54, 2.09)
Constant		0.23***
Goodness of fit	Sensitivity	55
	Specificity	66
	Rho-square	0.06

*p<0.05; **p<0.01; ***p<0.001

does not reveal any significant links between a change in health status and gender or age. However, the results are similar to those of Mustard et al.²⁸ in demonstrating a statistically significant relationship between a change in health status and aspects of lifestyle behaviours (e.g., smoking, health care use). Our results suggest that it is who you are, not where you live or your social networks, that shapes change in health status over the short term (i.e., approximately two years). This conclusion may be influenced by the fact that there was little variation in the contextual variables used in the analysis. For example, perhaps a different distribution on these variables, or alternative indicators, might have produced a different outcome.

In discussing the implications of this study, an additional limitation must be addressed. As noted by Mustard et al.,²⁸ the reliability of using a single likert-scale item to examine health status change over time has not yet been established – yet there is recent evidence that such a measure is responsive to changes in health.^{28,54} The results of this study contribute to the existing literature by informing understanding of both the stability of health ratings over time and determinants of health status change. The results highlight the key roles that socio-economic status and lifestyle behaviours play in predicting change. This

is only the beginning. Additional research should be undertaken to enhance our understanding; in particular, studies with larger sample sizes, longer time frames and more sensitive indicators of composition, context and collective are needed.

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RÉSUMÉ

Contexte : L'état de santé auto-perçu est devenu une mesure classique de l'état de santé de l'ensemble d'une population. De plus, les études en confirmation la validité comme indicateur de morbidité et de mortalité. Cependant, on s'est relativement peu intéressé à la façon dont l'état de santé auto-perçu change avec le temps, ni aux facteurs d'un tel changement. Cet article porte sur les facteurs de changement de l'état de santé avec le temps et utilise les données d'une enquête sur la santé au niveau du quartier.

Méthode : Des données d'enquête sur la santé (n=671) ont été recueillies en deux séries (2001 et 2003) dans quatre quartiers de la ville de Hamilton, en Ontario. Pour prédire le changement de l'état de santé auto-perçu entre les deux périodes, ainsi que les déterminants du changement, nous avons analysé par régression logistique une gamme de caractéristiques compositionnelles, contextuelles et collectives des sujets de l'enquête susceptibles d'être des variables explicatives.

Résultats : Environ le tiers de participants a éprouvé un changement d'état de santé entre les deux années de l'enquête. On notera à ce sujet que les principaux facteurs de changement de l'état de santé sont les caractéristiques compositionnelles des sujets (le tabagisme, l'utilisation des services de santé) par opposition à leurs caractéristiques contextuelles (le quartier où ils habitent) ou collectives (l'état civil). Contrairement aux résultats d'autres études sur la question, celle-ci n'indique aucun lien significatif entre un changement de l'état de santé et le sexe ou l'âge.

Conclusion : Ces résultats améliorent à la fois notre connaissance de la stabilité des estimations de la santé au fil du temps et des déterminants du changement de l'état de santé. Il faudrait pousser la recherche pour accroître cette connaissance, en particulier par des études d'échantillons plus importants, sur de plus longues durées et avec des indicateurs plus sensibles des caractéristiques compositionnelles, contextuelles et collectives.