Using Credit Scores to Understand Predictors and Consequences of Disease

A growing body of literature suggests consumer credit as an exciting new source for understanding relationships between economic well-being and health.[1–4] Consumer credit scores provide summary measures of personal financial history, incorporating both the use of positive credit and the ability to manage debt. Credit scores are increasingly used to understand health outcomes[1–4] because they can be informative about socioeconomic factors that contribute to health or disease outcomes, or they may reflect financial consequences of health or disease events. We introduce the credit score and highlight how it can add value to public health research.

HOW DOES CONSUMER CREDIT WORK?

In the United States, consumer credit scores provide a real-time, quantitative rating of a person's creditworthiness based on previous financial transactions and timely payments on loans, credit card balances, and other debts.[2,3] Credit scores are calculated by credit bureaus that use proprietary formulas based on the number and size of a borrower's loans and credit accounts, the length of time that credit has been established, and the amount of new credit. Those with high debt (usually relative to income or wealth) still may have good credit if they follow the payback schedule consistently, whereas those with low debt can have poor credit if they miss several payments, even at low total dollar amounts. Credit scores may be influenced by extreme economic events, such as foreclosures or bankruptcy, and more common events, such as late payments.

Credit scores pervasively guide what financial products and resources are available to aid in everyday life and health: mortgage interest rates, automobile loan and insurance premiums, interest rates, school loans, and even employment eligibility. In this way, credit scores have implications for household spending to fight disease or improve health, access to health insurance (especially through employment), or the physical and social environments that form the context for health and disease risk (e.g., through housing markets).

HOW ARE CREDIT SCORES RELATED TO HEALTH?

The relationships between credit scores and health are complex and bidirectional.

Credit scores and the various factors that determine credit can directly influence health outcomes and vice versa. Credit scores and health also may respond to common unobserved determinants that influence them both, and we cannot necessarily assume that one's credit score is exogenous to one's health. Thus, both causal and descriptive studies of these relationships can inform policy and care delivery.

Credit Scores May Be Predictive of Health

Credit scores may be predictive, by helping us to understand who is more likely to develop, treat, or manage a condition. Credit scores may reflect personal characteristics, such as one's tolerances for risky behaviors, or ability to manage complex processes, such as navigating payment schedules. For example, one study showed that individuals with higher bankruptcy risk were more likely to experience car crashes,[5] whereas another found that financial literacy and fluid intelligence (speed and capacity for processing and responding to information) were associated with higher credit scores.[2] These examples suggest that credit scores may serve as proxies for social and economic factors that are on the causal pathway between individual psychobehavioral characteristics and health.

Although having poor credit does not necessarily cause poor health, there could be clinical benefit to identifying key associations, such as whether patients who frequently pay bills late also struggle with medication adherence or follow-up care.

Financial Effects of Treatments and Diseases

Credit scores allow us to understand the financial consequences of health care treatments and long-term disease effect. Credit scores can reflect the financial consequences of a health event such as unpaid bills related to the cost of care or loss of ability to continue paid work or manage money.[5] Even one hospitalization for an acute condition can lower credit limits and scores, with an effect equivalent to more than half of the decline in credit

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TABLE 1—Trade-Offs Between Credit Scores and Common Measures of Socioeconomic Position

	Consumer Credit	Income	Wealth	Education
Responsiveness to life events	Sensitive to short- and long-term economic changes; reported monthly	Changes infrequently	Varies over life but generally increases	Often stable after early adulthood
Data access	Proprietary; based on unpublished formulas; self-report can be collected in surveys	Self-report widely available	Self-report widely available	Self-report widely available
Data availability	~20% of adults do not have credit history; large volume of credit data across the nation	Self-report missing in < 33% in population-based US health surveys[a]	Missing in < 20%; underreported in high-wealth households[b]; many have no or negative wealth	Widely available with < 1% missing[a]; applicable to nearly everyone
Data interpretation	Quantifiable score capturing access to additional capital to address health; scores across bureaus have different meanings	May not be predictive of purchasing power	Difficult to ascertain accurately for those with a mix of assets	Easy to ascertain but has different returns and meanings across cohorts and cultures

[a]Based on the US National Health Interview Survey, as reported in http://www.stat.columbia.edu/~gelman/stuff_for_blog/s6.pdf.
[b]Based on missing at least one item used in wealth calculations in the Panel Study of Income Dynamics, as reported in https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5351882.

limits following an unemployment spell.[6] An ecological study published in *AJPH* found small increases in credit card and mortgage default rates for areas with greater citywide influenza severity.[1]

Our recent work in long-term breast cancer survivors highlights the interplay between credit and health. We found that better credit posttreatment was associated with better health and less stress,[4] factors that may make it more likely that a patient's credit also improves in the future.

CREDIT SCORE: A UNIQUE INDICATOR OF HEALTH

Previous studies suggested a relationship between credit scores and health outcomes, above and beyond the contributions of other socioeconomic measures.[2,4] Table 1 highlights major strengths and limitations of using credit scores compared with other socioeconomic measures. A particular strength of the credit score is

how quickly it responds to health and life events, with a primary limitation being the high cost of obtaining these proprietary measures from a credit bureau.

Yet, commonly used socioeconomic measures, such as income, wealth, and education, all have their own limitations. These measures may not fully capture the additional resources that are available through consumer credit scores. For example, according to the Federal Reserve, 20% of US households in 2015 reported outspending their annual earnings, which suggests that income cannot fully capture a household's economic situation. In our recently published analysis, credit scores explained 14% of the variation in self-rated health of female breast cancer survivors, compared with at most 9% for any other socioeconomic measure.[4]

Patients may leverage credit to fill the gap between earnings and expenditures, and examining consumer credit scores is a unique indicator of how households fill that gap. Like all socioeconomic measures, consumer credit's

uses should be considered in the context of its trade-offs.

CHALLENGES AND OPPORTUNITIES OF CREDIT SCORES

Although use of credit scores for health research is promising, it also presents challenges. The Equal Opportunity Credit Act outlines what may not be used in credit scores (race, color, religion, national origin, gender, marital status, age, use of public assistance), but it does not prescribe what is included. Credit score models exclude data from institutions such as microlenders and faith- or community-based institutions and penalize borrowers who use subprime loans or fringe lenders. These products may be the only options available to lower-income and racial/ethnic minority households that infrequently or do not use banks.

As consumer credit data are increasingly used in health research, it is important to understand heterogeneity in the relationships between credit

and health for different groups. Inclusion of consumer credit to understand health must be considered in the context of health equity to avoid reinforcing health disparities.

At the same time, credit scores present opportunities as a socioeconomic measure that is a readily obtainable, single quantitative value that captures long- and short-term economic changes over time. It has been shown to predict a variety of health behaviors and outcomes,[1–7] with the potential to be applied to many more. Our own work suggests that self-reported consumer credit quality is highly correlated with objective credit score, which could be incorporated into population-based health surveys as a single item.[4]

In summary, consumer credit offers a promising measure for advancing public health research on how socioeconomic position "gets under the skin" and warrants additional exploration in studies of health and disease. *AJPH*

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REFERENCES
1. Houle JN, Collins JM, Schmeiser MD. Flu and finances: influenza outbreaks and loan defaults in US cities, 2004–2012. *Am J Public Health*. 2015;105(9):e75–e80.

2. Li Y, Gao J, Enkavi AZ, Zaval L, Weber EU, Johnson EJ. Sound credit scores and financial decisions despite cognitive aging. *Proc Natl Acad Sci U S A*. 2015;112(1):65–69.

3. Israel S, Caspi A, Belsky DW, et al. Credit scores, cardiovascular disease risk, and human capital. *Proc Natl Acad Sci U S A*. 2014;111(48):17087–17092.

4. Dean LT, Schmitz KH, Frick KD, et al. Consumer credit as a novel marker for economic burden and health after cancer in a diverse population of breast cancer survivors in the USA. *J Cancer Surviv*. 2018;12(3):306–315.

5. Morrison E, Gupta A, Olson L, Cook L, Keenan H. *Health and Financial Fragility: Evidence From Car Crashes and Consumer Bankruptcy*. 2013. Coase-Sandor Institute for Law & Economics Working Paper 655.

6. Dobkin C, Finkelstein A, Kluender R, Notowidigdo MJ. The economic consequences of hospital admissions. *Am Econ Rev*. 2018;102(2):308–352.

7. Lee Y, Song I. A study on the economic factor associated with suicide: debt and suicide ideation. *Ment Health Soc Work*. 2015;43(1):58–82.