

# The Economic Recession and Its Effect on Utilization of Elective Total Joint Arthroplasty

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## Abstract

The United States economy entered a recession in December 2007. This study aims to determine whether the utilization of elective orthopedic surgeries has been impacted by this recession. From January 2007 to December 2009 at a single private practice in New Jersey, 4820 total joint replacement procedures were scheduled, of which 649 of those were cancelled. The rate of cancellation for financial reasons was compared to multiple economic measures by linear regression analysis. The results show that the rate of financially motivated cancellations increased over time concurring with multiple financial markers reflecting the economic recession. The results suggest that the recession has created a financial barrier for a significant number of Americans, leading to decreased utilization of care. While there was a statistically significant increase in cancellations for financial reasons, the overall rate of cancellations in the total joint population is still low, representing only about 1% of all cases.

While healthcare utilization appeared resilient to prior economic downturns, the current recession has placed significant financial burden on all sectors of the healthcare industry. The United States economy entered a recession in December 2007, according to the National Bureau of Economic Research, which has persisted into the new decade.<sup>1</sup> The housing slowdown, credit crisis, stock market collapse, and rising unemployment rates have left Americans with doubts about the stability of the economy. This financial turmoil has forced most households to reassess their financial security and consequently to reprioritize their expenditures. The resulting effects of decreased consumer spending have permeated into most aspects of American commerce including healthcare.

In 2008, reports suggested that healthcare utilization declined during the recession and close to one-third of hospitals nationwide experienced a declining inpatient population.<sup>2</sup> One year after the recession began, a study, evaluating over 600 hospitals, showed that ambulatory surgeries declined by 1% and inpatient surgeries by 2.2%.<sup>3</sup> The reported decline in utilization is contrary to the steadily increasing trend of healthcare spending in the years leading up to the recession, as reported by the Bureau of Economic Analysis.<sup>4</sup>

The number of patients undergoing elective procedures has shown a significant decline relative to other areas of healthcare utilization.<sup>5</sup> In January 2009, the American Hospital Association reported that elective procedures have decreased moderately in 40% of hospitals nationwide, and decreased severely in 18% according to hospital administrations.<sup>6</sup> This decline in elective procedures has contributed significantly to the fiscal instability of hospitals as revenue from elective hospital admissions is critical to offset the costs stemming from Medicaid and charity care.<sup>4</sup>

Several studies examining the recession's impact on healthcare attribute the slowing utilization to declining employment rates and receding coverage from employer-sponsored insurance.<sup>2-5</sup> They reasonably argue that market turmoil is causing consumer reluctance to incur the costs of medical care, and therefore Americans are consuming less care. Despite the apparent correlation between trends in the economy and healthcare utilization, there is little data beyond the anecdotal that directly describe patients citing financial factors as the reason for not seeking or deferring care.

To address this issue, we conducted a retrospective study to examine reasons that patients cancelled elective total knee and hip arthroplasty during the economic recession. Elective surgery cancellation provides direct insight into the current economic recession and how it is creating financial barriers to healthcare utilization. Our approach is unique in that patients specifically identify financial motives for restraining their use of healthcare resources. The patient population previously sought care and then altered their treatment course due to changes in their financial status or concerns regarding the economy in general. This study sought to determine whether

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elective procedures in orthopedic surgery have been impacted by the economic recession, and determine how financially motivated cancellations correlate with trends in the economy.

## Materials and Methods

### Data Collection

We retrospectively reviewed all patients who were scheduled for elective orthopedic surgery at our practice in northern New Jersey from January 2007 through December 2009 to identify the cause of surgical cancellations. Overall, 4820 elective surgeries were scheduled during this time, which included the following procedures: unilateral or bilateral total knee arthroplasty (TKA), TKA revision, total hip arthroplasty (THA), or THA revision (femoral or acetabular). There were 1576 surgeries in 2007, 1511 in 2008, and 1733 performed in 2009. During this 3-year period, 649 procedures were cancelled, or 13.5% of all the scheduled surgeries. There were 195 cancellations in 2007, 198 in 2008, and 256 in 2009. While the total number of cancellations was fairly consistent year-to-year, cancellations due to financial reasons increased steadily from 10 in 2007, to 22 in 2008, and then 33 in 2009.

The cancellation of a patient's surgery was recorded as one event. A small portion of patients had more than one cancellation, but these repeated cancellations were not counted again, so as to not overweigh the number of cancellations.

The cancellations were categorized based on the reason of cancellation, as reported by the patient to the surgery practice administrative personnel. Cancellations were labeled as financial, personal, medical, second medical opinion, or improved condition. The personal category included cancellations due to patient anxiety about possible complications, family issues, scheduling conflicts, or other personal reasons that did not fit into the other categories. The financial category included causes for cancellation due to job insecurity preventing medical leave, changes in insurance coverage, loss of insurance coverage, unemployment, and other financially motivated reasons that prevented the patient from being able to undergo surgery. Medical reasons for cancellation were associated with concurrent dental infections, or pulmonary, cardiac, and other medical comorbidities that prohibited the patient from undergoing their procedure. Often, patients with medical reasons for cancelling surgery were rescheduled once the comorbidity was optimized. The second medical opinion category included patients who cancelled surgery to seek the opinion or definitive care of another physician. The category of improved condition included patients who reported symptom improvement and therefore did not feel surgery was necessary, or who wanted to pursue less invasive measures.

### Economic Data

Our study sought to understand the trend of financially motivated cancellations specifically with respect to both consumer sentiment as well as broader markers of the economy. Objective measures of economic prosperity were gathered from a number of financial sectors that included unemployment, consumer spending, and consumer savings. Data on the New

Jersey unemployment rate was obtained from the Bureau of Labor Statistics database.<sup>7</sup> Data on consumer purchases of automobiles, durable goods, and appliances were gathered from the Bureau of Economic Analysis.<sup>4</sup> Data on personal savings rate were also obtained from the Bureau of Economic Analysis.<sup>4</sup>

The study then selected measurements of consumers' subjective attitudes and expectations about the economic prosperity in the United States. The data were gathered from the Surveys of Consumers,<sup>8</sup> which publishes monthly reports on consumer sentiment in conjunction with the US Department of Commerce, Bureau of Economic Analysis. The survey has described American confidence in the economy since 1946 and is considered the leading consumer survey. The monthly survey is statistically designed to establish a sample population from over 500 interviews conducted by telephone to represent all American households, excluding those in Alaska and Hawaii. Each monthly survey contains approximately 50 core questions that track different aspects of consumer subjective impressions of the economy. Other questions assess the respondent's appraisal of present market conditions for consumer spending on vehicles, appliances, and other products. Our study examined selected measures that included: consumer sentiment, jobs plentiful, present situation, expectations, and plans to purchase appliances, or plans to purchase automobiles in the next six months. We averaged the monthly data points into biannual time points to compare with the surgical cancellation data.

### Data Analysis

The number of surgical cancellations for each reason was categorized into biannual time points. The first half of each year included surgeries cancelled from January through June, and the second half included surgeries cancelled from July through December. Six data points were established for the time period between 2007 and 2009. The number of cancellations during one time period was then compared to the total number of surgeries performed during that time period to standardize the value as a measure of odds. Linear regression was used to determine the correlation between the financial cancellation and the selected markers for economic prosperity and consumer confidence. Linear regression was chosen over Pierson correlation because we wanted to quantify the per unit increase in financial related odds against the per unit explanatory variables. Statistical significance was based on the ratio of the slope coefficient relative to the standard error of the estimate inferred from the student t-distribution. Significance levels were not adjusted for multiplicity. The sample size of six biannual values provides 80% power to detect a slope estimate that differs from zero at a 2-sided alpha level of 0.05 when the ratio of the square root of the mean square error and the absolute slope are less than or equal to 1.32. All analyses were performed using Excel for the personal computer on a Windows 2000 operating system.

## Results

The overall cancellation rate between January 2007 and December 2009 was 13.5% (649/4820). Out of the total number

**Table I. New Jersey Unemployment, Compared With Surgical Cancellation Reasons**

Reason For Cancellation	P values
Financial	.04*
Personal	.14
Second Opinion	.43
Medical	.44
Feel Better	.29

**Table II. Financial Cancellations, Compared With Survey of Consumers**

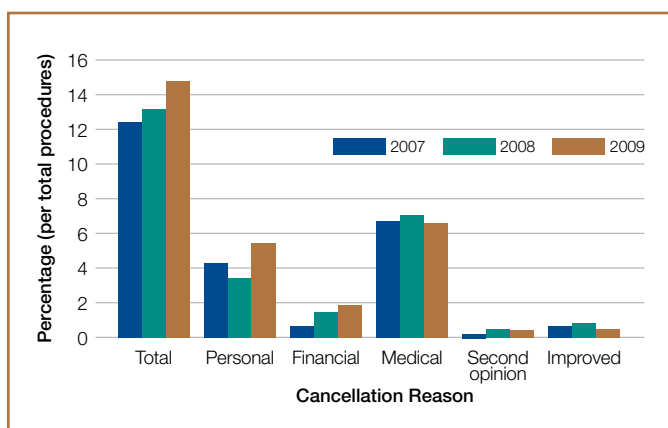
Survey Question	P values
Consumer Sentiment	.096
Present Situation	.021*
Expectations	.267
Jobs Plentiful	.016*
Business Good	.020*
Appliances (purchase within 6 months)	.052
Automobiles (purchase within 6 months)	.057

of cases, 1.3% were cancelled for financial reasons, 4.4% for personal reasons, 6.7% for medical reasons, 0.4% for second opinion, and 0.6% for improved condition (Figure 1).

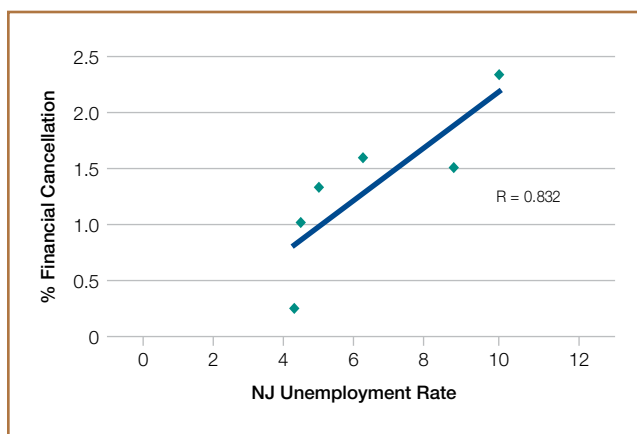
The study used statistical analysis of linear regression to determine correlations between reasons for surgical cancellation and economic markers. The increase in financial cancellations over time correlated with markers of the economic downturn, while none of the other reasons for TJA cancellation correlated with any of the economic indices examined in this study (Table I). There was a significant positive correlation between financial cancellations and the New Jersey unemployment rate (slope, 0.244;  $P < .040$ ) (Figure 2). There was also a significant negative correlation with consumers' impression of job availability ('Jobs Plentiful'; slope, -0.058;  $P < .016$ ) (Figure 3).

The increase in financially motivated cancellations did not correlate with any measures of consumer spending. Consumer expenditure on durable goods (slope, -0.001;  $P < .113$ ), automobiles (slope, -0.001;  $P < .093$ ), same store retail sales (slope, -0.123;  $P < .053$ ), and large appliances (slope, -0.001;  $P < .079$ ) all demonstrate a similar negative trend yet none reached the criteria set to reject the null hypothesis ( $P \leq .05$ ). Additionally, the personal savings rate did not establish a significant correlation (slope, 0.413;  $P < .104$ ).

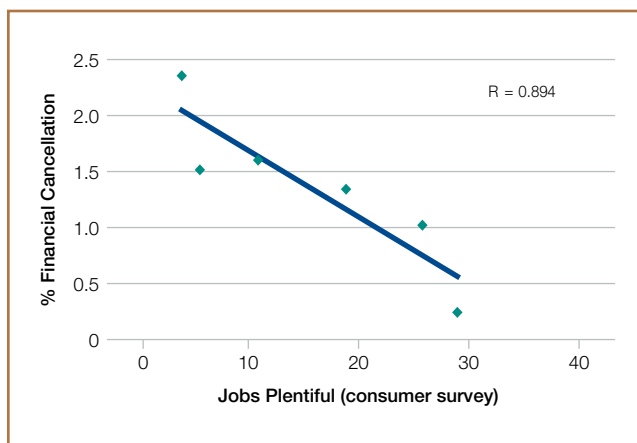
Some measures of consumer confidence in the economy, gathered from the Survey of Consumers, showed a significant correlation with the rate of financial cancellations (Table II). Consumer confidence about their present situation ('Present Situation'; slope, -0.013;  $P < .021$ ) (Figure 4); and sentiment



**Figure 1.** Cancellation rate by year and reason for cancellation between 2007 and 2009.



**Figure 2.** Linear correlation between the percentage of financially motivated cancellations and rate of unemployment in New Jersey.



**Figure 3.** Linear correlation between the percentage of financially motivated cancellations, and consumer sentiment about job availability based on the Survey of Consumers.

concerning the strength of business ('Business Good'; slope, -0.070;  $P < .020$ ) (Figure 5) both showed a significant negative correlation with the trend of financial cancellations. General

consumer sentiment about the economy ('Consumer Sentiment'; slope, -0.045;  $P < .097$ ) and consumer expectations for the future ('Expectations'; slope, -0.020;  $P < .267$ ) did not cor-

relate with the financial cancellations. Interestingly, consumer confidence about purchasing large expense goods within the next 6 months ('Automobiles' slope, -0.835;  $P < .057$ ; and 'Appliance'; slope, -0.206;  $P < .052$ ) showed closer correlation with the rate of financial cancellations than the actual consumer expenditures in these markets (Table III). These findings suggest that consumer sentiment about costly expenditures better reflects the trend in TJA cancellations than actual consumer spending.

The analysis also compared the linear correlation between financially motivated cancellations and other reasons for cancelled surgery. While financial cancellations showed no correlation with other reasons, it was significantly correlated to the overall increase in total cancellations over time (slope, 0.354;  $P < .018$ ).

### Discussion

To our knowledge, this is the first study to identify a patient population that directly cites financial concerns as the reason for decreased healthcare utilization. The study reviewed a broad spectrum of reasons for patients to cancel TJA and isolated financial reasons as the only factor to increase linearly over time from 2007 through 2009. Its chronological association with the recession suggests that recent economic conditions have significantly altered the course of orthopedic treatment in northern New Jersey, at least regarding total joint arthroplasty. The rate of financially motivated cancellations was compared to multiple economic indices (Figure 6) and the results indicate that such cancellations correlate significantly with both unemployment (Figure 7) and consumer confidence measures.

Employment is one of the most important avenues for Americans to access healthcare. More than 60% of Americans obtain health insurance through employer-based plans,<sup>9</sup> and a recent study estimates that a one percentage increase in unemployment correlates with the loss of employer-sponsored health insurance for 2.5 million beneficiaries and dependents.<sup>10</sup> The national unemployment rate more than doubled from 4.2% in the first half of 2007 to 8.7% in the second half of 2009.<sup>7</sup> This significant rise represented millions of households that lost healthcare coverage over this time period. In our practice, during this time period, the percentage of financially motivated cancellations increased nearly 10 fold from 0.25% to 2.35%.

It is therefore not surprising that the findings of this study show a close correlation between financial cancellations and unemployment. The unemployment rate in New Jersey and the consumer sentiment about the prevalence of available jobs were both statistically significant in correlating with the financial cancellation rate. Furthermore, many patients within the financial reasons category specifically cited insurance issues as the reason for being unable to afford treatment.

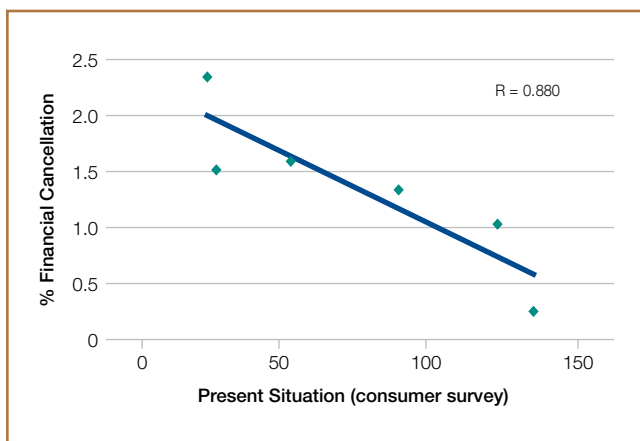


Figure 4. Linear correlation between percentage of financially motivated cancellations and consumer confidence about their present financial situation based on the Survey of Consumers.

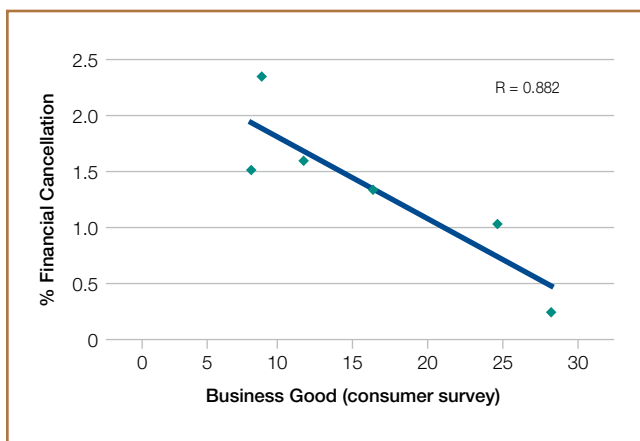


Figure 5. Linear correlation between percentage of financially motivated cancellations and consumer confidence about the strength of business based on the Survey of Consumers.

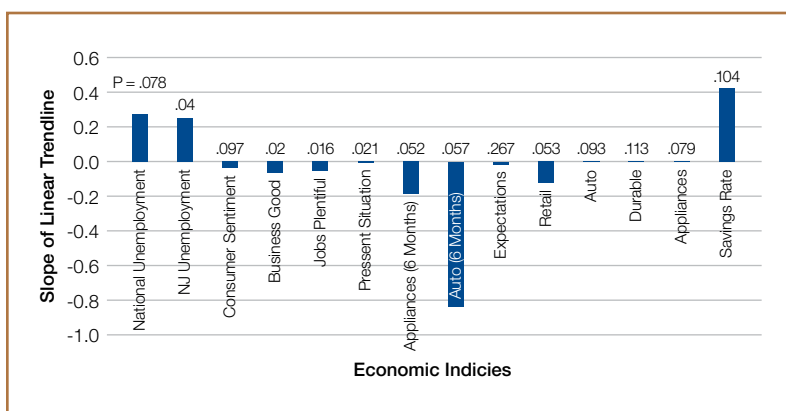


Figure 6. Slope of linear correlations between the percentage of financially motivated cancellations and various economic indices.

While unemployment is one factor contributing to declining health insurance coverage, it does not capture the full effect of the economic recession on employer-based insurance. Many companies have responded to the recession by scaling back coverage for their employees and have therefore transferred more of the cost of healthcare to their employees resulting in greater out of pocket expenses. In more costly procedures, such as TJA, the increased cost burden shifted to patients may be financially prohibitive.

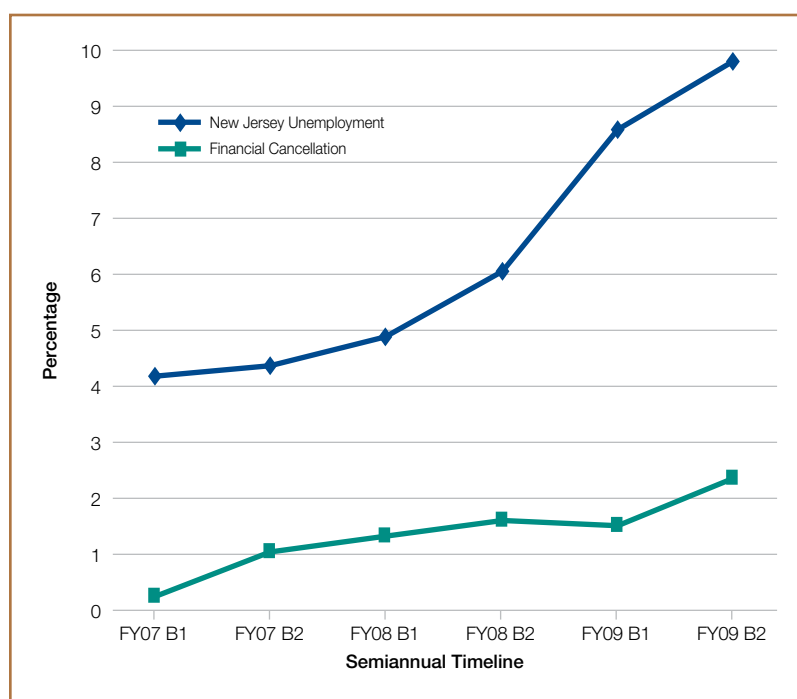
In addition to direct financial reasons for surgical cancellation, many Americans are increasingly concerned about taking time away from work due to job instability and risk of forced early retirement.<sup>11</sup> One study reports that over 50% of underinsured Americans reported going without necessary medical care due to cost.<sup>12</sup> As such, we see that the loss of insurance, or lack of adequate insurance or job security are all real barriers to medical care. Millions of households have been affected by the recession through various economy driven insults to employment-sponsored health insurance.

The study also considered consumer attitudes about the economy and compared them to the rate of financially motivated cancellations. The consumer confidence about the present situation, and about whether business was doing well showed significant correlation with the cancellation rate ( $P < .05$  and  $P < .02$ , respectively). These results suggest that peoples' confidence with their financial security impacts their decision about having elective orthopedic surgery. Not only does the actual unemployment rate, which is shown to directly affect health insurance coverage, but the subjective confidence in the economic climate correlate with cancelled elective procedures.

The rate of financially motivated cancellations can be interpreted as a reflection of consumer spending on elective procedures. If more people are cancelling procedures, for which they have already invested time and resources to arrange, it is likely that there is an additional population of patients that have refrained from even seeking elective TJA because of expected costs. Therefore, if we consider that the increased cancellation rate reflects a broader consumer trend of decreased expenditure on elective procedures, then the financial cancellation rate can be compared to other areas of consumer spending to measure its relative elasticity during the economic downturn. This study specifically examined whether changes in TJA utilization mirrored changes in other consumer markets, such as automobiles, large appliances, durable goods, and retail. While no statistically significant correlation was proven, a potential trend was identified. A similar trend was noted in the Consumer Survey regarding planned purchases of a new automobile or appliance in the upcoming 6 months. In sum, these findings suggest that elective arthroplasty may be affected

**Table III. Financial Cancellations, Compared With Objective Economic Measures**

Economic Index	Category	P values
Unemployment	New Jersey	.040*
Consumer Expenditures	Retail	.053
	Durable Goods	.113
	Large Appliances	.079
	Automobiles	.093
Personal Savings Rate		.104



**Figure 7.** Graph examining the percentage of financially motivated cancellations and of unemployment in New Jersey at semiannual time points from 2007 through 2009.

by the economy similar to other areas of consumer spending, although possible to lesser degree. While elective healthcare appears to have been impacted to a small degree, the negative effect was small in comparison to other industries such as auto and home sales. In past recessions, the healthcare industry may have shown greater resilience than other industries, as consumers would likely cut spending on clothes or electronics before forgoing medical treatment.<sup>13</sup> However, this recession has affected Americans more profoundly than past recessions, and the results from this study suggest there is not a distinct delineation between material goods and medical care.

A number of limitations of the present study deserve mention. While our study captured the effect of the economic downturn in a large patient population that cancelled surgeries, it does not provide a complete description of the economic effect on TJA utilization. In many respects, the study only

recognizes the tip of the iceberg as patients not seeking any treatment, and those relying on temporary treatments like pain medication or injections are not captured by the study. It should be noted that while the rate of financial cancellations increased during the 3 year time period, and was correlated with economic markers, the overall cancellation rate was quite low, both in terms of overall surgeries (1%), and as a percentage of total cancellations (10%). Additionally, although cancellations increased over the 3 years, the overall number of cases performed by this orthopedic practice also increased each year. This dichotomy may show that successful practices will continue to grow despite a poor economic climate and signs of economic barriers to surgery. Additionally, the data was gathered for the study by combining unilateral total knee, bilateral total knee, and total hip arthroplasty to provide one representation of TJA. While these surgeries are all elective orthopedic procedures and carry with them similar effects on improved quality of life, there are nonetheless important differences. For example, bilateral TKA is more costly and theoretically requires a longer postoperative recovery than the other procedures. Such differences may significantly affect the patients' decision on whether to cancel the procedure. Unfortunately, the number of cancelled surgeries at each time point was not sufficient to measure each surgery type separately and establish statistically meaningful correlations for each individual procedure.

The results of our study clearly illustrate a correlation between the economic recession and increased total joint cancellations due to financial reasons. More broadly, the results of our study may be consistent with other trends in healthcare utilization that indicate that the economic recession has placed a financial burden on a significant number of Americans that has directly placed a barrier to accessing healthcare. For example, one study demonstrated that women newly diagnosed with breast cancer show more advanced disease at initial presentation during economic recessions.<sup>14</sup> This suggests that elective but important testing and procedures get postponed in times of economic uncertainty. The study also demonstrates the important distinction between elective care and unnecessary care.<sup>14</sup> Many procedures that are deemed elective, such as breast cancer screening or TJA, actually play a crucial role in maintaining the health of an individual. While the breast cancer study highlights the importance of screening tests for decreasing mortality, other elective procedures like TJA are shown to significantly improve patient quality of life.<sup>15-17</sup> TJA improves disability and quality of life, and enables the employed to return to work and therefore provides significant health and economic benefits to individuals and society. We suggest that even in uncertain economic times, it is important to identify

patients delaying care secondary to financial considerations and devise strategies to reduce their barriers to medical care.

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