Causes and Consequences of Racial Disparities in Swimming

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Introduction and Motivation

Accidental drowning is a leading cause of death among African American youth. There are wide racial disparities in self-reported swimming abilities and extremely low black participation rates in competitive swimming. This paper builds a unique data set from existing sources that contributes to our understanding of the relationship between a) racial disparities in accidental drowning, and b) underrepresentation of blacks among competitive swimmers. It provides the first definitive evidence of a strong causal empirical relationship between two closely aligned phenomena: racial disparities in elite participation in one sport and racial disparities in a significant health outcome: accidental drowning. The Centers for Disease Control (CDC) report that drowning is the second leading cause of unintentional injury-related death for children between the ages of 1 and 14. Between 2000 and 2007, the fatal unintentional drowning rate for African Americans across all ages was 1.3 times that of whites. The fatal drowning rate of African American children ages 5 to 14 is 3.1 times that of white children in the same age range (Centers for Disease Control and Prevention, 2011).

The potential for reducing the health disparities such as obesity, diabetes and asthma through swimming and swim training is thwarted by the fact that black youth are severely underrepresented among one of the most popular recreational and competitive sports among whites: swimming. As a competitive sport, swimming is often regarded as one of the most exclusively white sports in the United States. USA Swimming reported that only 0.99 percent of its members were African American (USA Swimming, 2012).

Research on the relationship between swimming ability and drowning rates has produced conflicting evidence (Brenner, Saluja, & Smith, 2003). Brenner, et al. (2009) found that among those under 5, drowning rates were higher for those who had no previous instruction in swimming. However, there were no statistically significant impacts of swimming instruction on drowning rates for 5 to 19 year olds.

The significance of the present paper is the demonstration of a heretofore undocumented aggregate relationship between racial disparities in accidental drowning and underrepresentation among racial minority group members in competitive swimming. We provide compelling empirical evidence of a causal relationship between competitive swimming and drowning rates. This empirical relationship is robust and is found consistently for blacks but not for whites across a wide array of model specifications and estimation procedures.

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Data

Two variables are critical for our analysis: a) unintentional death rates due to drowning and b) competitive swimming participation rates. The information on unintentional drowning comes from the Centers for Disease Control (CDC). Public data by state, gender, and race was retrieved from the Fatal Injury Reports 1999–2007, or nine years of data. We use data for non-Hispanic white and African American children, 7 to 18 years of age for each state and each year.[3] Data on competitive swimming participation by gender and race comes from the Membership Statistics Reports of USA Swimming, the governing organization of youth competitive swimming in the United States. Data on lifeguard labor market on occupation and income was retrieved form the March supplement of the Current Population Survey (2003-2012).

Data for weather and geographical controls was retrieved from: the National Climatic Data Center – National Oceanic and Atmospheric Administration (NCDC-NOAA); the United States Geological Survey (USGS); and he Ocean and Coastal Resource Management- NOAA. Additional control variables by state and year, such as population density, income per capita, and percent population with college degrees was retrieved from the Statistical Abstracts of the United States—U.S. Census Bureau.[i] Other controls for the labor market for life-guards and recreational employees are estimated from the March Supplements to the Current Population Survey (CPS.)

Model and Results

A heuristic labor market model that provides a plausible narrative linking black drowning rates to black participation in competitive swimming is the following: when there are more minority swimmers on teams or in programs that offer training for lifeguards, the supply of minority lifeguards increases. Minority lifeguards are more likely to be employed in pools and recreation areas where there are large numbers of minority customers. Where there are more well-trained and competent lifeguards there should be fewer drowning. Relatedly, the relative dominance of swimming in a local market area is captured by the degree to which teenagers invest developing and advancing skills in a particular sport and thereby become eligible for employment in sports-related occupations during their teenage years.

A model explaining the importance of racial representation of lifeguard on competitive swimming is included. Where the probability of been a lifeguard is a function of the expected wage, the level of competitive swimming in the state and some other state control variables. [4]

To model the relationship between competitive swimming and drowning rates, this paper assembles a panel data set combining annual data by state, gender, race and ethnicity on (a) membership in the USA Swimming and (b) data on unintentional drowning from the CDC for children 7 to 18. The basic data set has 1,008 observations in the continental US for 9 years. The dependent variable is a measure of unintentional drownings, δ_{jt}, in the *jth* state, race, gender group

[3] Retrieved from the Data and Statistics (WISQARS) system: number of deaths, population and the crude death rates by race, gender, year and state.

[4] The expected wage will be estimated using a Mincer equation. The expected wage is measured as a relative wage for the specific cohort (16-21 years).

for the *t-th* year. It is a function of a vector of weather, geographic, social and demographic factors, *X*, as well as a measure of competitive swimming participation σ_{jt}.

$$\delta_{jt} = f(\sigma_{jt}; X_j) + \mu_{jt} \qquad (1)$$

Where *X* denotes a host of predictors of drowning disproportionalities and σ_{jt}. captures participation in the USA Swimming Association and where the error term, μ, is assumed to be normally distributed with standard properties.

Table 1 reproduces the substantive findings of Table 1 separately by race and gender. The results presented in this table are the marginal effects.**Table 1Estimated Coefficients of the Effect of Competitive Swimming Rates on Drowning from Tobit Fixed Effects Regression**

Variables	Black Males	White Males	Black Females	White Females
Swimmers Rate	**-16.5519*** **	-0.2654	**-2.7047** **	0.1139
	[5.226]	*[1.605]*	*[1.212]*	*[0.339]*
Population density	-0.0014	-0.0036***	-0.0007*	-0.0009**
	[0.001]	*[0.001]*	*[0.000]*	*[0.000]*
State Water Percentage	1.4356	5.3670***	0.3063	0.5734
	[1.268]	*[1.334]*	*[0.311]*	*[0.437]*
Summer Mean Temperature	0.0231	0.1363	0.0427	0.0987**
	[0.145]	*[0.143]*	*[0.040]*	*[0.043]*
State Water Percentage* Summer Mean Tempe	-0.0233	-0.0769***	-0.0042	-0.0081
	[0.018]	*[0.019]*	*[0.004]*	*[0.006]*
Cooling Degree Days (CDD)	0.0167**	0.0067	-0.0003	0.0012
	[0.007]	*[0.007]*	*[0.002]*	*[0.002]*
Coast Line (miles)	0.0006**	-0.0003	-0.0000	0.0002
	[0.000]	*[0.000]*	*[0.000]*	*[0.000]*
CDD*CoastLine	0.0000	0.0000**	0.0000	-0.0000
	[0.000]	*[0.000]*	*[0.000]*	*[0.000]*
Year	-0.4010***	-0.3397***	-0.0858***	-0.1053***
	[0.096]	*[0.092]*	*[0.024]*	*[0.029]*
Observations	252	252	252	252

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The impacts of competitive swimming are almost exclusively concentrated among blacks. The percentage of water in the state area substantially influences drowning events for white males, a 1 unit increase in state water percentage will increase the drowning events by 5.37. By way of contrast, the effects of competitive swimming are large and statistically significant in the black male and black female equations. The effects are larger for black males than they are for black females, further underscoring the fact that competitive swimming manifests itself in disparate ways by race and gender. Increasing competitive swimming among black males by one percent reduces the drowning events by 16.55 while for black females it will reduce the drowning events by 2.70.

An alternative model we use to accommodate that drowning is a rare event is a Poisson model which let us capture the zero drowning rates. It takes the following form:

$$\ln(\delta_{jt}) = \sum \beta_{jy} x_{jt} + s_{jt}\sigma_{jt} \qquad (2)$$

$$\delta_{jt} = \prod e^{\beta_{jy} x_{jt}} * e^{s_{jt}\sigma_{jt}} \qquad (3)$$

Table 2 presents the results of estimating the impacts of competitive swimming rates on drowning rates across all years separately by race and gender, using the Poisson model.**Table 2 Estimated Coefficients of the Effect of Competitive Swimming Rates on Drowning from Poisson Model**

Variables	Black Males	White Males	Black Females	White Females
Swimmers Rate	**-6.9418*** **	-0.3349	**-9.7520** **	-0.0393
	[1.947]	*[0.701]*	*[4.195]*	*[0.399]*
State Water Percentage* Summer Mean Tempe	0.0184***	0.003	0.0171	0.0077***
	[0.005]	*[0.006]*	*[0.025]*	*[0.003]*
Year	-0.0779*	-0.0015	-0.1342	-0.1109**
	[0.045]	*[0.025]*	*[0.084]*	*[0.052]*
Constant				
	252	252	252	252
Number of Census_Region	7	7	7	7

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The impacts of competitive swimming in the Poisson model are almost exclusively concentrated among blacks. We can conclude that a one unit increase in competitive swimming reduces drowning rates by about 6.94 percent for black males and 9.75 percent for black females. For whites, the reduction is only 0.33 percent for males and 0.04 percent for females. The effects of competitive swimming are large and statistically significant in the black male and black female equations. The effects are larger for black females than they are for black males, further underscoring the fact that competitive swimming manifests itself in disparate ways by race and gender.

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