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Factors Affecting Minority Drowning

Nathan T. Martin and Dean Witman

Research has revealed that racial or ethnic minorities historically drown at higher rates than the general population. Current research still has not identified or exposed fully the risk factors experienced by these groups that account for this disparity. By employing a review of the literature approach typical of the methods used in the humanities, the present article identifies many of the factors that explain this difference (e.g., age, sex, location, access, supervision, swimming lessons, and communication) and suggests future research that would help to illuminate the detailed circumstances that account for this ethnic gap in drowning rates (e.g., drowning-related research that takes race and ethnicity into account more consistently).

Research has revealed that racial and ethnic minorities historically drown at higher rates than the general population (Centers for Disease Control, 2008). Recent authors (Hastings, Zahran, & Cable, 2006; Irwin, Drayer, Irwin, Ryan, & Southall, 2008; Wiltse, 2007) have focused primarily on issues related to overt or unintentional discrimination and, more specifically, the limited opportunities minority groups have had to swim in places generally considered safe. Although overt discrimination may have been a factor, it did not fully explain why some minority groups, mainly African-Americans, have had less access to the most desirable swimming areas or have poorer prospects for receiving instruction in swimming or water safety.

Therefore, the authors designed the current study to more fully identify and expose the risk factors experienced by these groups that account for a greater proportion of the disparity in drowning rates. For example, one study found that drowning rates among White children younger than five years of age were greater than among Black children. In contrast, from ages five through 19 years old, the racial disparity in drowning rates was inverted (Branche-Dorsey, Russell, Greenspan, & Chorba, 1994). These researchers concluded that younger White children most likely had more access to aquatic settings at younger ages, accounting for the gap before five years old, but they failed to account for or investigate the inverse gap among Black children who were older than five years.

The present article identifies many of the factors that explain these differences and suggests future research that might help to make clear the detailed circumstances that account for this gap. More thoroughly examining the risk factors associated with minority drowning hopefully will stimulate conversation about whether more accessible swimming infrastructure should be a greater public priority and specifically whether more infrastructure investment should occur in minority neighborhoods.

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Method

The primary research purpose of this investigation was to identify the factors that explain why racial or ethnic minorities drown at higher rates than the general population. A review of the literature approach, typical of the methods used in the humanities, was used to conduct this investigation. After a cursory examination of the drowning literature, an initial set of over 40 potential variables that might constitute factors relating to the disproportionately high minority drowning rates were entered as keywords into ResearchPro, a federated-search application that scans multiple databases (including ABI/INFORM Global, Academic One File, Cumulative Index to Nursing and Allied Health Literature, Cambridge Scientific Abstracts, Journal Storage [JSTOR], Nursing and Allied Health Coalition, Science.gov, Science Direct, and YourJournals@OVID). A federated database system is a type of meta-database management system (DBMS) that transparently integrates multiple autonomous database systems into a single “federated” database.

Because of limitations of the search application, access to all potential articles that exist on the identified variables was incomplete. To alleviate this limitation, the reference lists of foundational articles on drowning were reviewed, and the Google Scholar search engine was employed to exhaust further potential resources of interest. Combined with primary keywords like *drowning* and *minority*, a partial list of factors that were used in the initial search included the following:

- Location (including supervision, access to definitive medical care, warning signs, safety equipment, residential/public/neighborhood/open water)
- Access (infrastructure for swimming, swimming lessons)
- Education (swimming lessons, formal education, swimming experience)
- Fear (as a deterrent to swimming altogether or as an enabler to avoid swimming lessons that might prevent drowning)
- Risk-taking behavior (swimming alone, at night, in unguarded settings)
- Alcohol (as an aggravating factor or as a subject of legislation)
- Immediate prior activity (activity in which victim was engaged before drowning, such as boating or hiking)
- Immediate prior conditions (maintenance, weather, water clarity, distractions from supervision, crowding, time of year)
- Engineering controls (absence or presence of government mandates)
- Other aquatic or drowning studies that specifically controlled for race or ethnicity

Once identified and collected, the authors reviewed each article for evidence that either supported or rejected a relationship between the disproportionate minority drowning rate and the proposed factor. Specifically, the authors used a null hypothesis model proposing that no relationship between the disproportionate minority drowning rate and the factor of interest. More specifically, the authors conducted an initial cursory examination to determine whether race or ethnicity was minimally addressed as part of the study. If race or ethnicity was not minimally taken into account as a variable in the study, then the study was excluded. If race or ethnicity was minimally taken into account, the authors examined whether the study under

consideration provided evidence that either supported or rejected a relationship about the role of race or ethnicity on drowning. If a study provided evidence that a relationship existed, its contribution was included within the Results section and the authors elaborated upon its relevance in the Discussion and Recommendations sections.

A total of 26 articles met the criteria where race or ethnicity was minimally addressed as part of the study. The authors chose to exclude a bibliography as part of this article because it included a cursory review of hundreds of drowning-related articles that either did not minimally address race or ethnicity or only helped to identify other resources to further exhaust the search process. Since the present article has not specifically used these other resources as direct contributors, citations do not appear. Interested readers should contact one of the article authors for more information about the list of other resources.

Results

Based on the final review of 26 articles where either race or ethnicity was minimally addressed as part of the study, the authors identified factors that provided the clearest evidence related to the primary research question. These factors included age, sex, and location (Brenner, Trumble, Smith, Kessler, & Overpeck, 2001), access (Hastings et al., 2006), supervision (Landen, Bauer, & Kohn, 2003), swimming lessons (multiple studies, including Brenner et al., 2001; Dawson, 2006; Saluja, Brenner, Trumble, Smith, Schroeder, & Cox, 2006; Sanford, Givens, Radisch, & Smith, 2001) and communication (Agócs, Trent, & Russell, 1994).

Age

Regarding these factors, particularly key findings by Brenner et al. (2001), included that among one to four year old males, Blacks drown at lower rates than do Whites. Then, after ten years of age, Black males drown at greater than ten times the rate of White males of the same ages. Branche-Dorsey et al. (1994) and subsequently Saluja et al. (2006) both attributed the higher drowning rate among younger White children to these children's greater exposure to residential swimming pools.

Sex

Articles about drowning frequently point out the disproportionate male drowning rate and several attempted to explain why this discrepancy exists irrespective of other factors. For example, by posing the question, "Why Are Most Drowning Victims Men?" Howland, Hingson, Mangione, Bell, and Bak (1996) sought to explain sex differences in aquatic skills and behaviors and their corresponding influence on drowning rates. While the researchers had respondents identify themselves as White (non-Hispanic), African American, Hispanic, or Asian, the study provided no direct explanation for sex differences in drowning rates across race or ethnicity.

Factors that showed a relationship between risk-taking behavior and higher male drowning rates included findings that men generally considered themselves better swimmers even though women were more likely to have received swimming instruction and to have received more hours of swimming instruction. They also

found that males were more likely than females to consume alcohol during aquatic activities and in greater amounts and engage in other risk-taking behaviors such as swimming alone, at night, and in unguarded settings, and boating without a life jacket (Howland et al., 1996).

As mentioned previously, Brenner et al. (2001) also pointed out that Black males, older than the age of five years, drown at higher rates than White males of the same age. While this difference confounds the variables of sex and race, the researchers attributed the difference to the characteristics of the settings in which aquatic activity occurred rather than to behavioral differences. For example, they felt the differences could be explained by more crowded conditions for minorities who experienced higher drowning rates.

Location

In addition to the sex-based factor Brenner et al. (2001) mentioned, they also provided the important finding that drowning rates in *swimming pools* among Black males are much higher than children older than five years of age and that, even though drowning rates were low for both races among female children of this age, Black females were at greater risk of drowning in swimming pools compared with White females of the same age. This study suggested that the swimming pools in which Black adolescent males swim are inherently less safe because they may be more crowded, have poorer supervision, and their staffs may not be as skilled in rescue and resuscitation. Saluja et al. (2006) provided the additional insight that differences in the location where people of different races drown persist even when researchers have adjusted for income levels.

Access

Hastings et al. (2006) showed that a relationship exists between the disproportionate minority drowning rate and the extent to which at-risk groups are subject to “the principle of social exclusivity that limits access” to swimming as an activity and swimming infrastructure. This study examined minority participation rates in swimming, which has implications for social exclusivity, as well as race-specific drowning rates. The study found that access to instructional and competitive programs, as well as the infrastructure that supports these programs, affects age, sex, and particularly race differences in swimming participation.

Supervision

Many studies concluded with recommendations that parents and the public as a whole watch over people participating in aquatic activity and thereby ensure that they are safe and acceptably behaved. Landen et al. (2003), who examined the role of supervision and drowning among children six years old and younger in Alaska and Louisiana, found that minority groups, specifically Alaska Natives and Louisiana Blacks, had higher drowning fatality rates due to less adequate or absent supervision compared with other groups. While numerous additional studies also addressed supervision and drowning rates, none explicitly included race/ethnicity as a factor and thus were excluded because they had no bearing on the primary research question.

Swimming Lessons

Evidence supported an inverse relationship between fewer opportunities to take swimming lessons and higher minority drowning rates. Brenner et al. (2001), Saluja et al. (2006), Sanford et al. (2001), and Dawson (2006) have all provided evidence demonstrating a relationship between the disparity in drowning rates and the reduced tendency of members of minority groups to receive swimming instruction.

Communication

In a study that was based exclusively in Imperial County, California, a border region between the United States and Mexico, Agócs et al. (1994) found the most frequent activity before drowning was illegal entry into the United States. In addition, all of the illegal entrants with known ethnicity were Hispanic, providing evidence of a possible English-Spanish language barrier with respect to communication. This study concluded with a recommendation that to reduce drowning fatalities, authorities should consider installing warning signs with universal symbols and broadcasting public service announcements in Spanish in border towns.

Other Factors

In preparing for the scrutinized review, authors identified numerous factors that might help to explain the differential in drowning rates. In several instances, we found articles that took into account a risk factor of interest, but the studies did not truly consider race or ethnicity, or another factor considered a reasonable proxy, in addition to these other variables. These factors included immediate prior condition of cold weather (Hedberg, Gunderson, Vargas, Osterholm, & Macdonald, 1990) and family members' education (Quan, Bennett, Cummings, Henderson, & Del Beccaro, 2001). As a result, the authors could neither support nor reject the presence of a relationship based on a review of these studies.

For other factors, such as activity immediately before drowning, that is, swimming, wading, or attempting a rescue (Browne, Lewis, & Stark, 2003; Smith & Brenner, 1995), the authors found that previous research was unable to explain the differences in drowning rates by race or offered only speculation about what the reasons might be. In addition, the authors examined other factors, such as a greater tendency to engage in high-risk activities such as swimming alone or using alcohol (Howland et al., 1996), or a relative absence of engineering controls like residential fencing (Smith & Brenner, 1995). The authors were unable to establish any significant evidence of a relationship between these factors and higher minority drowning rates.

One factor that was not identified initially was self-reported swimming ability. This factor was identified through the literature review and peer review process and included in the current study. Specifically, Gilchrist, Sacks, and Branche (2000) reported that 37% of the general adult U.S. population self reported possessing limited swimming ability. When examining race/ethnicity separately, 62% of African Americans self-reported not knowing how to swim, compared with 32% for Whites, 47% for Asians, and 44% for Hispanics. In addition, Moran (2008) found significant differences among ethnicities in self-reported abilities, specifically swimming and performing CPR, as well as appropriate water safety behaviors like drinking alcohol

and wearing dangerous clothing/footwear. Moran also found that his respondents' perceptions of risk posed by rock fishing, their self-efficacy, and their preventive behaviors were also significantly different when compared across ethnic groups.

Discussion

The factors that provided the most direct support for detecting a relationship between the drowning rate and a given factor were the factors of age, sex, and location (Brenner et al., 2001), access, and, specifically, social exclusivity (Hastings et al., 2006), supervision (Landen et al., 2003), swimming lessons (multiple studies including Brenner et al., 2001; Dawson, 2006; Saluja et al., 2006; Sanford et al., 2001), and to some extent communication (Agócs et al., 1994).

Age

While several studies have shown that comparative drowning rates differ across children's ages, the reasons for the differences are not clear. For example, although multiple studies have suggested that White children's increased exposure to residential swimming pools might balance the racial disparity in drowning rates among infants and toddlers, there was little empirical basis supporting this idea. The other factors that account for the higher minority drowning rate as children age, particularly the dramatically increased drowning rate among Black males over ten years old, have not been explained fully.

Sex

Based on the examination of Howland et al. (1996), one might settle on the idea that the higher male drowning rate for Black adolescents is due to a greater inclination toward risk-taking behavior, such as consuming alcohol during aquatic activities or swimming alone or in unguarded settings. Not having access to the researchers' raw data, however, does not allow for this claim to be substantiated. Nonetheless, it is recommended that more research studies be conducted to determine why higher drowning rates are so much higher for minority males, particularly among African American teenagers.

Location

A common observation encountered among the studies was that minorities drown more frequently in swimming pools. In contrast, Smith and Brenner (1995) suggested that the higher drowning rate for Blacks and Native Americans they observed might be due to increased aquatic activity in remote, unsupervised locations. These researchers appear to have based their statement on the results of Davis, Ledman, and Kilgore's (1985) study in the sparsely populated, mostly desert state of New Mexico. A small proportion of the cases in Davis et al.'s study (1985), just four out of 191, were Black. While the assertion about remote, unsupervised locations might be valid for some minority groups, such as among Native Americans, the present review found no other support for this assertion among minorities generally. Nonetheless, as Saluja et al. (2006) suggested, examining cultural factors and

their definitions may be important for addressing drowning prevention efforts in different geographical locations and cultures.

Access

In addition to the apparent challenge to the more common observation that minorities drown more frequently in swimming pools, Smith and Brenner (1995) also introduced the possibility that groups that are denied access to relatively safe swimming areas (e.g., guarded pools and beaches) might tend to perform aquatic activities in remote, unguarded settings where they are even more likely to drown. Brenner et al. (2001) and others have characterized the access situation as one in which the swimming pools available to minorities are more likely to be public and have poorer levels of supervision. In the case of many hotel/motel pools, the operators often do not provide any supervision at all and simply post “swim at your own risk” signage. Based on the historical perspective of Dawson (2006), limited pool access might not be the sole or primary cause of the Black community’s rejection of learning to swim but instead a “coherent choice no longer to swim in natural waterways” (p. 1355). As stated previously, cultural factors might be at work here that deserve further investigation.

Supervision

Research has generally found that adequate adult supervision tends to mitigate the risk of drowning. Absent, poorer, less, or inconsistent supervision largely explain higher minority drowning rates. Howland, Birckmayer, Hemenway, and Cote (1998) conducted a study that focused on the effect of minimum legal drinking age laws, revealing that lower drowning rates have generally corresponded to increases in “urbanicity,” a factor often associated with racial and ethnic minorities, and according to those researchers, better supervision. Although it was undeterminable whether Howland et al. (1998) defined urbanicity as the site of the drowning incident or the victim’s residence, urbanicity generally refers to the degree to which a location is considered urban based on a high population density as the defining element. Based on this research, one might predict that minority groups, which are often concentrated in urban areas where better supervision is available, would drown at lower rates than the general population. Despite the age of this study and that it did not explicitly take race or ethnicity into account, it does raise challenging questions that further research might help to explain. For example, to the extent that it failed to show a relationship between drowning and minimum legal drinking age laws, the study pointed out that passing legislation where no scientific support exists might have different consequences than the ones intended. The study also called attention to the possibility that governmental action designed to address one issue might have the inadvertent effect of making another problem dramatically worse.

Swimming Lessons

The pediatric community has held for several years that children older than four years need to learn to swim to lessen their risk of drowning (American Academy of Pediatrics Committee on Injury, Violence, and Poison Prevention, 2003). A more recent study (Brenner et al., 2009) found that formal swimming lesson participation

could explain 88% of the reduction in drowning risk, even among one to four year old children who many would have considered too young to benefit from this instruction. It is not surprising that, when race or ethnicity are taken into account, groups whose participation rates in swim lessons are lower than the general population are more likely to drown.

Communication

The recommendations of Agócs, Trent, and Russell (1994), while not applicable across the board, remind us that although it might appear to be common sense, language difficulties might explain a portion of the differences in the drowning rates between minorities and the general population. Because this study focused on drowning rates along the United States-Mexico border, it pointed out that interventions based on communication must be neutral with respect to language. Communication neutrality may include using universal symbols or accounting for the diverse language capabilities of the audience such as through the use of well trained translators.

Other Factors

For several factors, such as family members' education levels and immediate prior conditions, the current study found no evidence in support of a relationship within the studies examined. This determination came about most frequently from the studies' failure to consider race or ethnicity, or a reasonable proxy, along with the other potential risk factors. One possible explanation for this failure is that current data systems do not record pertinent details surrounding a drowning incident, including the characteristics of the injured person, so that researchers can understand better the relationships between fatal and nonfatal drownings and the proximate conditions present at the time death or injury occurs. The government might alleviate this situation if it required hospitals as a condition of reimbursement under government health insurance programs to capture the detailed external causes of an injury in their hospital discharge or emergency department data systems.

Where the current study was unable to find evidence of a relationship between higher minority drowning rates and any one particular variable, we recommend that future researchers should attempt to duplicate or disprove earlier findings rather than disregarding the potential impact of such variables. If anything, this review of the literature related to minority drowning reveals how scant knowledge is about this phenomenon and showed how much more work is needed. For example, Hastings, Zahran, and Cable (2006) alluded to the puzzle they encountered regarding the increased rate of drowning that Blacks experience as their opportunities for exposure to the water increase. One would think that increased opportunities to swim would result in more experience, better swimming ability, more knowledge of water safety, and consequently lower drowning rates. As this group of researchers suggested, Blacks who live in areas where swimming infrastructure exists might still swim fewer times a year than Whites do, and therefore having access to greater opportunities might not correspond to a lower drowning risk. Because gaps in our understanding like this one continue to exist, many questions exist for future researchers to replicate or refute the findings of previous studies.

As for self-reported swimming ability, previous articles such as Gilchrist et al. (2000) and Moran (2008) have shown that members of minority groups typically report lower levels of water safety-related skill than the population as a whole. This research noted this finding among highly disparate groups from African Americans to indigenous ethnic populations in New Zealand. Because the differences were reported by the respondents themselves, rather than measured by an objective test of their abilities, these findings again call into question to the objectivity of communication and cultural factors previously mentioned. While swimming ability may not translate directly into a higher degree of safety, being able to swim certainly increases one's chances of surviving inadvertent water entry such as falling out of a boat or sliding down a riverbank. Even though people who cannot swim well usually limit their exposure to water, the life-saving benefit of being able to swim should not be discounted.

Conclusion

Much evidence supports the contention that, despite the overall trend toward decreased drowning rates, minority groups continue to drown at higher rates than the population as a whole. The present study reviewed much of the current literature and noted that numerous studies have omitted race or ethnicity as a main or mediating factor. The reasons for this omission are puzzling and unexplainable simply because it should be an easy factor to isolate in an investigation. As such, future drowning-related research should take race or ethnicity into account more consistently. Hospitals, providers of prehospital care, and other emergency response agencies should upgrade their injury surveillance systems to capture these variables and other important information uniformly. Only by identifying the detailed circumstances associated with drowning incidents will it be possible to eliminate the race-specific gap in our understanding about drowning rates that currently exists and has existed historically. Current efforts to bring about more complete and reliable collection of drowning-related data will provide researchers and practitioners new insights into existing and proposed interventions that might favorably reduce drowning rates for both minority groups and the general population. This review also provides support for efforts to address more of the relevant risk-related factors in future research.

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