

ORIGINAL RESEARCH ARTICLE

Public Perceptions on Why Women Receive Less Bystander Cardiopulmonary Resuscitation Than Men in Out-of-Hospital Cardiac Arrest

BACKGROUND: Women who suffer an out-of-hospital cardiac arrest receive bystander cardiopulmonary resuscitation (CPR) less often than men. Understanding public perceptions of why this occurs is a necessary first step toward equitable application of this potentially life-saving intervention.

METHODS: We conducted a national survey of members of the public using Mechanical Turk, Amazon's crowdsourcing platform, to determine reasons why women might receive bystander CPR less often than men. Eligible participants were adults (≥ 18 years) located in the United States. Responses were excluded if the participant was not able to define CPR correctly. Participants were asked to answer the following free-text question: "Do you have any ideas on why women may be less likely to receive CPR than men when they collapse in public?" Descriptive statistics were used to define the cohort. The free-text response was coded using open coding, and major themes were identified via classical content analysis.

RESULTS: In total, 548 subjects were surveyed. Mean age was 38.8 years, and 49.8% were female. Participants were geographically distributed as follows: 18.5% West, 9.2% Southwest, 22.0% Midwest, 27.5% Southeast, and 22.9% Northeast. After analysis, 3 major themes were detected for why the public perceives that women receive less bystander CPR. They include the following: (1) sexualization of women's bodies; (2) women are weak and frail and therefore prone to injury; and (3) misperceptions about women in acute medical distress. Overall, 41.9% (227) were trained in CPR while 4.4% reported having provided CPR in a medical emergency.

CONCLUSIONS: Members of the general public perceive fears about inappropriate touching, accusations of sexual assault, and fear of causing injury as inhibiting bystander CPR for women. Educational and policy efforts to address these perceptions may reduce the sex differences in the application of bystander CPR.

Sarah M. Perman, MD,
MSCE
Shelby K. Shelton, MPH
Christopher Knoepke,
PhD, MSW
Kathryn Rappaport, MD
Daniel D. Matlock, MD,
MPH
Kathleen Adelgais, MD,
MPH
Edward P. Havranek, MD
Stacie L. Daugherty, MD,
MSPH

The views expressed in this manuscript represent those of the authors, and do not necessarily represent the official views of the National Heart, Lung, and Blood Institute, National Institute of Aging, or the American Heart Association.

Key Words: cardiopulmonary resuscitation ■ heart arrest ■ sex

Sources of Funding, see page 1067

© 2019 American Heart Association, Inc.

<https://www.ahajournals.org/journal/circ>

Clinical Perspective

What Is New?

- From a national sample of US adults, public perceptions of why women receive less bystander cardiopulmonary resuscitation than men may be concern for sexualization of women's bodies and fear of accusations of assault, fear of causing injury, or misperceptions of women in cardiac arrest.
- Women identified fear of inappropriate touching as the greatest inhibitor to providing cardiopulmonary resuscitation, while men identified fear of sexual assault or harassment accusations.

What Are the Clinical Implications?

- Until public concerns about providing cardiopulmonary resuscitation to women in cardiac arrest are addressed by way of policy and education, women may continue to receive less bystander cardiopulmonary resuscitation and potentially have worse outcomes from out-of-hospital cardiac arrest.

Provision of bystander cardiopulmonary resuscitation (CPR), when a member of the public provides chest compressions to a person found unconscious and without a pulse, is associated with improved rates of survival with good neurological recovery.^{1,2} Recent literature has suggested a sex disparity, with women receiving bystander CPR at notably lower rates than men.^{3–6} A North American study utilizing Resuscitation Outcomes Consortium data have shown that women who suffer a witnessed out-of-hospital cardiac arrest (OHCA) receive CPR 6% less than men,⁵ a finding reproduced in the Ontario Prehospital Advanced Life Support Study showing an absolute difference in bystander CPR of 5% for women.⁴ Specifically, Blewer et al found that women receive bystander CPR in 39% of witnessed OHCA events in comparison to 45% of men who receive bystander CPR. Additionally, the authors report that this sex difference in bystander CPR contributed to overall survival, where men were found to have better odds of survival to hospital discharge when compared with women (odds ratio, 1.29; 95% CI, 1.17–1.42; $P < 0.01$).⁵ Understanding the reasons behind this difference is necessary to implement strategies to improve rates of bystander CPR and overall survival for women with OHCA.

Some authors have speculated that modesty/social norms regarding exposing/touching a woman's chest,^{7,8} bias created by educational programs,⁹ and under-recognition of cardiac disease in women¹⁰ might be responsible for this difference. To date, no empirical data to support these hypotheses for public perceptions have been reported.

Therefore, we conducted a prospective survey of a national sample of US adults with the primary objective to explore public perceptions as to why women who have cardiac arrest in public receive bystander CPR less often than men. The secondary objective was to determine if differences in themes could be detected by the sex of the respondent. Finally, participants were surveyed to determine if they have had prior CPR training, the purpose for their training, and if they have ever provided bystander CPR.

METHODS

The data that support the findings of this study are available from the corresponding author on reasonable request.

Study Design

A prospective national survey of English-speaking US adults familiar with CPR was performed via electronic survey. Survey respondents answered a 12-question survey that consisted of both multiple-choice questions and a single open-ended question allowing individuals to freely report their response. Subjects were reimbursed \$1 for their participation.

Data Source

The survey was created in Research Electronic Data Capture (REDCap),¹¹ and Amazon's Mechanical Turk (MTurk) was used to recruit participants. MTurk is a national crowdsourcing web-based platform that was created as an online labor market.¹² MTurk has been deployed in the social and behavioral sciences, as well as in clinical research, to accrue a national sample of respondents.^{13,14} In a recent survey of MTurk workers, ~55% of US participants are women.¹⁵

Participants

Study participants were adults (≥ 18 years) currently residing in the United States and English-speaking. To maximize the quality of the responses, the survey was only available to MTurk workers with a "Master Qualification." To be considered an MTurk Master, workers have consistently demonstrated high-quality work across a spectrum of surveys. Master qualification is determined by statistical modeling, is assigned based on success, and cannot be requested by the worker. Master status can also be revoked should the quality of work decline (www.mturk.com). Eligible participants were initially asked a multiple-choice knowledge question to determine if they knew that CPR is "providing chest compressions to an unresponsive person." If they answered this question incorrectly, their survey was eliminated from further analysis. Participant age, race/ethnicity, sex, state in which they reside, and highest level of education were collected. Respondents utilize a unique MTurk identifier to prevent repeat participation. This study was approved by the Colorado Multiple Institutional Review Board.

Data Collection

The survey tool was created by the full study team and finalized after an iterative process. The primary question of interest

was an open-ended question: "From studies we know that women receive bystander CPR less often than men. Do you have any ideas on why women may be less likely to receive CPR when they collapse in public?" The participants were then allowed to answer freely in an open text box that had no character limitations. The survey included 11 multiple choice questions, including 2 questions that were utilized as "attention questions" to ensure that participants are not simply clicking through the survey without reading the questions. Consistent with other MTurk surveys, this strategy is to guarantee quality data and serves as an internal check to ensure full respondent attention and participation. If the survey respondent failed an attention question and answered "I don't know" to the open-ended question, their responses were excluded from further analysis. The full survey is reported elsewhere (see [Appendix A in the online-only data supplement](#)).

Statistical Analysis

Descriptive statistics were utilized to describe the demographics of the study cohort. In addition, proportions were used to describe the study cohort's prior experiences with training in CPR and application of CPR in actual practice. Demographic information including participant age, race/ethnicity, sex, and state in which they reside was reported by percentages. Location of residence was then collapsed into region for reporting purposes. Data were analyzed using statistical software (STATA v.14; StataCorp, College Station, TX).

Inductive qualitative methods were utilized in analyzing the data captured via the open-ended question, "Do you have any ideas on why women may be less likely to receive CPR when they collapse in public?" First, inductive reasoning was utilized to identify patterns within the observations in order to begin to identify themes. Responses were formally coded using inductive open coding to identify subthemes.¹⁶ Each participant's comments were assigned codes that were defined after the initial review of the data. Multiple codes could be applied to each subject's comments, as codes were not deemed to be mutually exclusive. The data were coded by 2 researchers (S.M.P., S.K.S.), and any discrepancies in coding were reconciled via consensus.

Final counts for code use were assigned via classical content analysis, a method where quantitative counts are assigned for similar codes or responses. Fisher exact test was used to test if there were differences in codes stratified by respondent sex. Overarching themes were identified utilizing thematic analysis based on the frequency with which codes were referenced in survey respondents' open-ended comments.¹⁷ Thematic analysis is used to analyze multiple comments that determine thematic meaning regarding a specific phenomenon across a set of data or responses.¹⁸

RESULTS

A national sample of 548 US adults was recruited via the MTurk platform. Among the total cohort, 4 subjects were unable to accurately define CPR and were excluded from further analysis. From the remaining 544 participants, 6 incorrectly answered an imbedded attention

question. On further review, 4 respondents who incorrectly answered an attention question gave usable data for the open-ended question. The 2 responses without usable open-ended responses were excluded from further analysis, while the 4 usable responses remained. Thus, 542 total surveys were analyzed.

Survey participants were equally male and female (Table 1). The survey participants were largely white and represented each region of the United States (Table 1). The mean age of participants was 38.8 ± 10.6 years with ages ranging from 21 years to 74 years. All of the respondents had at least a high school diploma, while almost half of the respondents (44.6%) obtained a college diploma.

Within the final cohort of survey respondents who were familiar with CPR, 41.7% ($n=227$) reported that they knew how to perform CPR (ie, they had knowledge of how to provide chest compressions to an individual in cardiac arrest). Most identified work or a volunteer activity as the reason they learned CPR (58.2%), while another 12.8% indicated that they had learned CPR within a school curriculum. Other reasons this cohort learned CPR are described in Table 2. Of note, only 24 individuals (4.4%) had actually provided CPR in a medical emergency, and 10 of those individuals reported that the patient requiring CPR was a woman.

All survey responses were read in entirety, and a codebook was created. Table 3 describes the codes identified and gives free-text examples as to how the code was applied. Via content analysis, codes were counted and further categorized by the sex of the respondent (Table 4). On reviewing themes that were more specific to male respondents versus female respondents, men were more likely to identify the fear of being accused of sexual assault/harassment more frequently than women (40.0% versus 29.3%, $P=0.01$).

Using thematic analysis, the identified codes were further categorized into 3 major themes, as detailed in Table 5. The first identified theme is focused on sexualization of the female anatomy and associated fears of social stigma or accusations of sexual assault. In the following excerpts, survey respondents describe a fear of touching or exposing women in acute medical emergency:

"I think that people are afraid to touch the breast region, so hesitate to administer CPR"
—Male, age 39.

"Bystanders, especially male bystanders, may be afraid to touch women especially in the chest area... anxious that their help may be unnecessary and therefore touching may be misconstrued"
—Female, age 48.

"Men are afraid of seeming like perverts" —Male, age 27.

Table 1. Survey Participant Demographics, Level of Highest Education, and Current Region of Residence

Variable	n=542	%
Sex		
Female	270	49.8
Male	267	49.3
Transgender	5	0.9
Race/ethnicity		
American Indian or Alaska Native	1	0.2
Asian	33	6.1
Black	40	7.4
Hispanic or Latino	18	3.3
Native Hawaiian or other Pacific Islander	2	0.4
White	441	81.4
Other	7	1.3
Education		
Less than a high school diploma	0	0.0
High school diploma or equivalent	65	12.0
Some college	167	30.8
College diploma	242	44.6
Graduate training or beyond	68	12.5
Region		
West	100	18.5
Midwest	119	22.0
Northeast	124	22.9
Southwest	50	9.2
Southeast	149	27.5

“There may be patriarchal or misogynist biases preventing people from attempting to aid the collapsed woman. For example, they may feel the woman ‘belongs’ to someone else and so attempting CPR on her may cause social offense. They may be nervous about touching her chest due to the sexualization of breasts” –Male, age 33.

Interestingly, respondents clearly expressed that their actions would be misconstrued as inappropriate or potentially might have legal ramifications when they specifically described concerns regarding accusations of sexual assault or sexual harassment:

“Men don’t want to get charged with rape” –Male, age 35.

“Some people may be afraid of some kind of lawsuit, in particular a sexual lawsuit. They don’t want to chance having their life ruined just for trying to save someone else” –Female, age 36.

“Touching of the chest area in women is forbidden in many societies. Now a days, you could be

accused of sexual assault, whether it is being given by a man or a woman to a woman” –Male, age 40.

A large majority of respondents clearly identified the fear or being accused of sexual assault as a major driver in why women do not receive CPR at the same rates as men. Again, the concern regarding accusations of sexual assault or harassment was described more frequently by men who responded to the survey. Descriptions of sexual assault and harassment ranged from descriptors such as “groping” or “molestation” to the extreme of “rape.” Given the high frequency of this code within the data, our findings suggest that public perceptions regarding the sexualization of women’s bodies and the fears of accusations regarding sexual assault are important factors that may influence the decision to withhold CPR from unconscious women in public.

The second theme identified is a concern that women are physically weak or fragile and, therefore, could be injured should they receive bystander CPR. Women were often described as “weak,” “fragile,” or “frail” and more prone to injury because of their stature. For example, survey respondents made the following statements regarding their fears of causing injury while performing CPR on women:

“People might be afraid of hurting them since women tend to be smaller and more fragile looking than men” –Female, age 31.

“Men are scared to do cpr on a woman because they risk breaking a rib” –Female, age 39.

“Women tend to be smaller than men, and chest compressions can be very forceful. It might be assumed that giving CPR to a woman might cause further injury if the woman is particularly small in stature” –Male, age 27.

“I think people might be afraid to injure a thin woman. Also a man might feel that he could potentially be violating a woman by touching her chest area with so much pressure” –Female, age 55.

Table 2. Survey Participant Reasons for Obtaining CPR Training (n=227)*

Reason	n	%
I am required for a work or volunteering activity	132	58.2
I am the primary caretaker to a family member who might need CPR in the future	14	6.2
I have children at home and CPR might be necessary for an emergency	40	17.6
I felt a responsibility to my community	55	24.2
I learned in school	29	12.8

*Respondents were allowed multiple responses.
CPR indicates cardiopulmonary resuscitation.

Table 3. Codebook That Describes Relevant Codes Applied to the Question, “Why Do Women Receive Less Bystander CPR Than Men?”

Code	Excerpts From Survey Responses
Accused of sexual assault (sexual harassment)	“People are intimidated by women and the new trend of accusing everything as sexual harassment. People simply do not want to get involved.”
	“Men, who are more likely to react in these cases and perform CPR, don’t want to touch the women for fear of being accused of sexual assault after saving her life.”
Accused of physical assault	“Men are afraid to damage them, or be sued later for abuse/pain.”
	“Men don’t want to worry about assault charges. Women are often deemed more fragile.”
Accused of assault without context (not physical or sexual)	“A fear of being perceived as assaulting the woman.”
	“Men may be less likely to want to risk a assault charge brought on by a woman who has collapsed.”
Afraid to hurt/injure	“People might be afraid of hurting them since women tend to be smaller and more fragile looking than men.”
	“May be people are afraid to hurt women if they perceive them as more fragile?”
Inappropriate touching	“People are more concerned about harming a woman in this situation or being thought of as someone who is trying to inappropriately touch or interact with a woman.”
	“Men might be afraid to give them CPR because they are afraid to touch them.”
Breasts/exposure	“Men don’t want to appear grabby or awkward placing their hands on a woman’s breast they don’t know.”
	“People don’t want to touch their breasts. it may be harder to find the breastbone in women as well, depending on the size of the breasts.”
Mouth to mouth	“Because if it’s a man, they might think it’s awkward to do mouth to mouth with a woman.”
	“Because CPR is giving mouth to mouth sometimes maybe that could a reason why.”
Women don’t have cardiac arrest/are not taken seriously	“They are not known to have as many heart attacks in public, they are known to be healthier.”
	“Not knowing why they collapse, heart disease not thought of for women.”
Women are emotional, overdramatic, faking	“People tend to not take women as seriously as they take men.”
	“Maybe people assume they are being dramatic and overreacting so CPR isn’t needed.”
Men are less likely to help	“Men are less likely to help?”
	“Men are less likely to put their hands on a woman?”
Society/stigma	“Society has pretty strict standards about making contact with a woman, even if it is to provide medical attention. Men in particular may be worried about being perceived as acting inappropriately even if their intentions are entirely pure.”
	“The #metoo movement.”
No comment/don’t know	“I can’t even imagine this happening. I don’t think this is a real fact.”
	“I have no idea.”

CPR indicates cardiopulmonary resuscitation.

Notably, concerns regarding injury to women seem to be derived by a difference in perceived strength of women, and that they might incur injury that men don’t receive when they are in receipt of chest compressions. A minority of participants cited concerns over being accused of physical assault; however, it is feasible that given legal protections to bystanders (Good Samaritan Laws), this fear is somewhat reduced in comparison to concerns regarding the legal ramifications of sexual assault:

“I think our world has become, ‘sue’ crazy in that people will sue for the many ridiculous reasons and win. I fear this is one reason why some will choose not to get involved” –Female, age 55.

Finally, the third identified theme describes poor recognition by the public that women are in cardiac arrest. Survey respondents focused on misperceptions due to media representations of cardiac arrest on television and in the media, potential bias encouraged by models or mannequins for CPR training, and perceptions that women are “overly dramatic” or not commonly subjects with sudden cardiac death. Examples to this effect are listed below:

“They are not known to have as many heart attacks in public, they are known to be healthier, they may not be as dramatic or loud about their episode” –Female, age 29.

“They are not aware the woman is experience[ing] cardiac arrest. Even doctors often fail to recognize

Table 4. Identified Codes That Explain Perceptions of Why Women Receive Less Bystander Cardiopulmonary Resuscitation Stratified by Respondent Sex

Free Text Codes	Total Use of Code (n=542)	Female Use of Code (n=270)	Male Use of Code (n=267)	P value
Accused of sexual assault (sexual harassment)	183 (33.8%)	79 (29.3%)	104 (40.0%)	0.01
Accused of physical assault	8 (1.5%)	4 (1.5%)	4 (1.5%)	0.63
Accused of assault without context (not sexual or physical)	22 (4.1%)	14 (5.2%)	8 (3.0%)	0.14
Afraid to hurt/injure	76 (14.0%)	44 (16.3%)	31 (11.6%)	0.07
Inappropriate touching	188 (34.7%)	87 (32.2%)	100 (37.5%)	0.12
Breasts/exposure	124 (22.9%)	61 (22.6%)	62 (23.2%)	0.47
Mouth to mouth	15 (2.8%)	6 (2.2%)	9 (3.4%)	0.29
Women don't have cardiac arrest/cardiac disease	42 (7.7%)	24 (8.9%)	18 (6.7%)	0.22
Women are emotional, overdramatic, faking	26 (4.8%)	16 (5.9%)	10 (3.7%)	0.32
Men are less likely to help	14 (2.6%)	6 (2.2%)	8 (3.0%)	0.39
Society/stigma	11 (2.0%)	9 (3.3%)	2 (0.8%)	0.03
No comment/don't know	57 (10.5%)	28 (10.4%)	28 (10.5%)	0.54

signs of heart disease in women, and the general public sees heart issues as being a 'male' problem. Women's heart disease goes untreated and young women are more likely to die from heart disease than young men, or so I have read, because of this incorrect bias" –Male, age 33.

"The perception that the illness is more serious in men" –Male, age 29.

Within our study cohort, 24 individuals reported performing CPR, of whom 58% were women (14/24). In secondary analysis among this experienced CPR cohort, responses mirrored the themes identified in the larger cohort. The experienced CPR performers cited concerns about inappropriate touching (12 counts) and the exposure/presence of breasts (6 counts) most frequently, with fear of sexual harassment (5 counts) as the third-most-cited subtheme. Of the 3 major themes, (1) sexualization of women's bodies was referenced 23 times; (2) women being weak and frail and therefore prone to injury was described 7 times; and (3) misperceptions about women in acute medical distress was described 3 times.

On review of the responses to the open-ended question, frequently, the survey respondent assumed that the bystander responding to a collapsed woman was male. Responses often referenced a male bystander and the concern that "he" might have in response to a collapsed woman. On review of our survey, it was evident that the sex of the bystander was never described. Interestingly, this assumption was described frequently, as can be determined by many of the responses listed previously as excerpts from the 3 themes and the multiple codes (Tables 3 and 5). This was an unexpected finding and suggests a bias in perceptions about who is providing bystander CPR.

DISCUSSION

This study was a national survey of US adults exploring public perceptions on why a sex difference in the provision of bystander CPR exists. The cohort had equal proportions of men and women, with a mean age of 38.8 ± 10.6 years. Participants were English-speaking, represented all regions in the United States, and had achieved at least a high school diploma. Approximately half of the respondents were trained in CPR, and most identified a work or volunteer requirement as the reason they were trained. Thematic analysis of the open-ended response to the question "Do you have any ideas on why women may be less likely to receive CPR when they collapse in public?" revealed 3 major themes identified as barriers to the provision of CPR to women. The themes identified included (1) sexualization of women's bodies; (2) women being weak and frail and therefore prone to injury; and (3) misperceptions about women in acute medical distress. The comments that were recorded include a rich portrayal of public perceptions as to why women receive less bystander CPR than men.

Our study is the first to explore public perceptions of why community bystanders may or may not respond to an unresponsive woman in cardiac arrest. Previous literature has clearly documented a disparity in rates of bystander CPR received by women with OHCA. Large database studies conducted in the United States,⁵ Europe,⁶ and Canada⁴ have found notable differences, with women receiving bystander CPR 6% less often than men. While differences in the provision of bystander CPR are only a single component in the chain of survival, as delineated by the American Heart Association, bystander CPR has been attributed to improved rates of survival with neurological recovery.^{1,2} Therefore, this disparity may considerably affect overall rates of survival for women with OHCA. While

Table 5. Utilizing Thematic Analysis, 3 Major Themes and 8 Subthemes Were Identified From the Cohort of 542 Responses That Explain Public Perceptions on Why Women Receive Less Bystander Cardiopulmonary Resuscitation Than Men

Major Theme	Subtheme	Representative Quote
Women's bodies are sexualized (510)	Fear of being accused of inappropriate touch (183)	Worried about stepping over the line in terms of harassment and groping People are less likely to touch the chests of women because it's been ingrained in our culture that doing so is always wrong Society has pretty strict standards about making contact with a woman, even if it is to provide medical attention
	Fear of being accused of sexual assault (188)	"Cuz [sic] a man doesn't want a lawsuit for touching a woman" "Because people don't want to be accused of sexual harassment or rape" "People are afraid that the woman or other bystanders might react negatively, thinking that you are attempting to sexually assault the woman"
	Breasts/exposure (124)	Reluctance because of female breasts being on the chest "Perhaps people are worried about appearing to fondle the breasts of women"
	Mouth to mouth (15)	"People are worried about... appearing to kiss women" "Maybe because it would seem like kissing them"
Women are perceived as physically weak or fragile and prone to injury (84)	Afraid to injure (76)	"They are afraid of hurting them by breaking a rib" "Because people are afraid to hurt women" "They might be scared to injure them during the process since females usually have smaller frames"
	Afraid to be accused of nonsexual assault (8)	"Men are afraid to damage them, or be sued later for abuse/pain" "Men don't want to worry about assault charges."
Misperceptions about women in acute medical distress (68)	Women don't have cardiac arrest/ cardiac disease (42)	"People would assume that women are weak and faint often" "People don't expect women to have heart attacks"
	Women are emotional, overdramatic, faking (26)	"People tend to not take women as seriously as they take men" "Men are conditioned to not believe women and generally think they are hysterical or over-reacting people think the woman is faking it"

Number in parentheses represents the total number of times the theme or subtheme was observed. Themes were not mutually exclusive.

the incidence of bystander CPR has been shown to be lower for women, and investigators have theorized why this might occur, the question of why this difference exists had not previously been directed to the public.

Our findings are similar to other studies examining factors associated with bystanders providing CPR. In a study of CPR-trained community bystanders who had provided CPR, investigators found that facilitators to provision of CPR included prior hands-on CPR training and the knowledge that providing CPR would not cause harm but was instead a necessary life-saving provision.¹⁹ These bystanders referenced many aspects of their own training that provided confidence to act but did not specifically address barriers to provision of treatment, especially with regard to disparities in sex. In another study, community members in neighborhoods with low rates of bystander CPR were queried about barriers and facilitators to the provision of bystander CPR. Major barriers to performing bystander CPR identified by participants included (1) fear of legal consequences; (2) emotional issues; (3) knowledge; and (4) situational concerns.²⁰ While there are overlaps in the themes identified between this study and our findings, sex-specific concerns regarding sexual assault and female anatomy prevailed in our survey of the public perception of why women receive less CPR than men. Understanding barriers and facilitators to provision of bystander CPR globally can help to further contextualize the differences that

prevail when discussing why women receive less CPR. In order to combat this disparity, sex-specific public concerns must be addressed. We must strive to increase overall rates of bystander CPR in US communities while reducing the differences observed between men and women.

Interestingly, a majority of the survey participants irrespective of their sex assumed that the bystander administering CPR was male. When queried about why women might receive less bystander CPR, respondents assumed that the dilemma would include a male rescuer, and men cited concern about sexual harassment or assault accusations. With respect to the sex of rescuers, researchers in Austria found that women were less willing to provide bystander CPR or to apply an automated external defibrillator to a person who had collapsed from cardiac arrest.²¹ We propose that a potential factor that might mitigate some of this disparity is to encourage, empower, and educate more women to provide bystander CPR.

While we find our study results to be revealing, there are limitations that should be described. This national sample of survey participants differs from the overall US census given that we were sampling from a select cohort of survey respondents ("Master Qualification" within MTurk) in order to obtain the highest caliber of data.^{22,23} This national sample of survey participants may differ from the overall US census given that we were sampling from a select cohort of sur-

vey respondents within MTurk. Participation in MTurk requires registration and internet access. Prior work has found that the workers on the MTurk platform are not significantly different from respondents using other survey platforms including mailed surveys.^{12,24,25} Participants were also required to have “Master Qualification” within MTurk and may not represent the broader MTurk community. We purposely selected Master Quality respondents in order to obtain the highest caliber of responses to the open-ended question. Future studies will include purposeful sampling to validate our findings in cohorts more representative of the broader US census, including a more diverse sample by race/ethnicity and education status. Future studies will include purposeful sampling to ensure that the study cohort is more representative of the US census for race/ethnicity. Survey respondents were knowledgeable about CPR; however, we did not require that they have been trained in CPR nor that they have provided CPR. Therefore, their response was purely their perception and not their actual practice. While this might be seen as a limitation, we found that asking for general perceptions was valuable at this stage of investigation to identify the barriers that women face in receiving bystander CPR.

This national survey provides insights into barriers that community bystanders may perceive when faced with resuscitating an unknown woman. Our findings suggest targets for training methods and policy changes that may improve rates of bystander CPR among women. For example, basic life support educational materials could be modified to incorporate data regarding disparities in rates of bystander CPR by sex. While significant strides are being made to increase the rate of bystander CPR, including mandating CPR training for graduating high school seniors, 911 dispatcher–assisted bystander CPR and telephone applications to improve community response to cardiac arrest, addressing disparities, cannot be ignored. Additionally, future educational interventions or public service announcements could be developed to help allay the fears of sexual assault identified from this national sample. In regards to policy changes, the overwhelming public concern for a charge of “sexual assault” or “sexual harassment” could be addressed in a similar manner to how “Good Samaritan Laws” targeted the fear of causing injury in a medical emergency. Without addressing the concerns of the public with regards to fear of causing injury or potentially being accused of sexual assault, our findings suggest women may continue to receive less bystander CPR, a simple maneuver clearly associated with better survival and neurological recovery from OHCA. Additional work is needed to further explore these barriers to inform future research, improve current training methods, and motivate policy changes.

CONCLUSIONS

Previous studies have confirmed that women receive less bystander CPR than men when they have an OHCA. Survey respondents from a national sample of US adults familiar with CPR identified the following reasons for this disparity: (1) sexualization of women's bodies; (2) women being weak and frail and therefore prone to injury; and (3) misperceptions about women in acute medical distress. Further study is necessary to determine appropriate methods and interventions to combat these perceptions, and if this will result in improved rates of bystander CPR for women with OHCA.

ARTICLE INFORMATION

Received September 1, 2018; accepted November 14, 2018.

The online-only Data Supplement is available with this article at <https://www.ahajournals.org/doi/suppl/10.1161/circulationaha.118.037692>.

Correspondence

Sarah M. Perman, MD, MSCE, Department of Emergency Medicine, University of Colorado, School of Medicine, Leprino Building (Mailstop B-215), 12401 E 17th St, Aurora, CO 80045. Email sarah.perman@ucdenver.edu

Affiliations

Department of Emergency Medicine (S.M.P., S.K.S.), Center for Women's Health Research (S.M.P., C.K., S.L.D.), Division of Cardiology (C.K., S.L.D.), Division of Geriatric Medicine (D.D.M.), Department of Medicine, University of Colorado School of Medicine, Aurora. Colorado Cardiovascular Outcomes Research Group, Denver (S.M.P., C.K., D.D.M., E.P.H., S.L.D.). Adult and Child Consortium for Outcomes Research and Delivery Science, Aurora, CO (C.K., D.D.M., S.L.D.). Section of Emergency Medicine, Children's Hospital of Colorado, Aurora (K.R., K.A.). VA Eastern Colorado Geriatric Research Education and Clinical Center, Aurora, CO (D.D.M.). Department of Medicine, Denver Health Medical Center, CO (E.P.H.).

Sources of Funding

This project was directly supported by a grant from the Center for Women's Health Research, University of Colorado, and the List Family Foundation. Dr Perman is supported by K23 HL138164 from the National Heart, Lung, and Blood Institute. Dr Knoepke is supported by the American Heart Association. Dr Matlock is supported by R21 AG059114 from the National Institute of Aging and R01 HL136403 from the National Heart, Lung, and Blood Institute. Drs Daugherty and Havranek are supported by R01 HL133343 from the National Heart, Lung, and Blood Institute and by award 15SFDNRN24470027 from the American Heart Association.

Disclosures

None.

REFERENCES

1. Bobrow BJ, Spaite DW, Berg RA, Stolz U, Sanders AB, Kern KB, Vadeboncoeur TF, Clark LL, Gallagher JV, Stapczynski JS, LoVecchio F, Mullins TJ, Humble WO, Ewy GA. Chest compression-only CPR by lay rescuers and survival from out-of-hospital cardiac arrest. *JAMA*. 2010;304:1447–1454. doi: 10.1001/jama.2010.1392
2. Malta Hansen C, Kragholm K, Pearson DA, Tyson C, Monk L, Myers B, Nelson D, Dupre ME, Fosbøl EL, Jøllis JG, Strauss B, Anderson ML, McNally B, Granger CB. Association of bystander and first-responder intervention with survival after out-of-hospital cardiac arrest in North Carolina, 2010–2013. *JAMA*. 2015;314:255–264. doi: 10.1001/jama.2015.7938
3. Ahn KO, Shin SD, Hwang SS. Sex disparity in resuscitation efforts and outcomes in out-of-hospital cardiac arrest. *Am J Emerg Med*. 2012;30:1810–1816. doi: 10.1016/j.ajem.2012.02.018

4. Safdar B, Stolz U, Stiell IG, Cone DC, Bobrow BJ, deBoehr M, Dreyer J, Maloney J, Spaite DW. Differential survival for men and women from out-of-hospital cardiac arrest varies by age: results from the OPALS study. *Acad Emerg Med*. 2014;21:1503–1511. doi: 10.1111/acem.12540
5. Blewer AL, McGovern SK, Schmicker RH, May S, Morrison LJ, Aufderheide TP, Daya M, Idris AH, Callaway CW, Kudenchuk PJ, Vilke GM, Abella BS; Resuscitation Outcomes Consortium (ROC) Investigators. Gender disparities among adult recipients of bystander cardiopulmonary resuscitation in the public. *Circ Cardiovasc Qual Outcomes*. 2018;11:e004710. doi: 10.1161/CIRCOUTCOMES.118.004710
6. Karlsson V, Dankiewicz J, Nielsen N, Kern KB, Mooney MR, Riker RR, Rubertsson S, Seder DB, Ståmmet P, Sundé K, Søreide E, Unger BT, Friberg H. Association of gender to outcome after out-of-hospital cardiac arrest—a report from the International Cardiac Arrest Registry. *Crit Care*. 2015;19:182. doi: 10.1186/s13054-015-0904-y
7. Kramer CE, Wilkins MS, Davies JM, Caird JK, Hallihan GM. Does the sex of a simulated patient affect CPR? *Resuscitation*. 2015;86:82–87. doi: 10.1016/j.resuscitation.2014.10.016
8. Wallen R, Tunnage B, Wells S. The 12-lead ECG in the emergency medical service setting: how electrode placement and paramedic gender are experienced by women. *Emerg Med J*. 2014;31:851–852. doi: 10.1136/emermed-2013-202826
9. Greenberg MR, Pierog JE. Evaluation of race and gender sensitivity in the American Heart Association materials for advanced cardiac life support. *Gen Med*. 2009;6:604–613. doi: 10.1016/j.genm.2009.11.002
10. Chang AM, Mumma B, Sease KL, Robey JL, Shofer FS, Hollander JE. Gender bias in cardiovascular testing persists after adjustment for presenting characteristics and cardiac risk. *Acad Emerg Med*. 2007;14:599–605. doi: 10.1197/j.aem.2007.03.1355
11. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42:377–381. doi: 10.1016/j.jbi.2008.08.010
12. Shapiro DN, Chandler J, Mueller PA. Using Mechanical Turk to study clinical populations. *Clin Psychol Sci*. 2013;1:213–220.
13. Truitt AR, Monsell SE, Avins AL, Nerenz DR, Lawrence SO, Bauer Z, Comstock BA, Edwards TC, Patrick DL, Jarvik JG, Lavalley DC. Prioritizing research topics: a comparison of crowdsourcing and patient registry. *Qual Life Res*. 2018;27:41–50. doi: 10.1007/s11136-017-1566-9
14. Anestis MD, Butterworth SE, Houtsma C. Perceptions of firearms and suicide: the role of misinformation in storage practices and openness to means safety measures. *J Affect Disord*. 2018;227:530–535. doi: 10.1016/j.jad.2017.11.057
15. Difallah D, Filatova E, Ipeirotis P. Demographics and dynamics of mechanical Turk workers. In: *Proceedings of the Eleventh ACM International Conference on Web Search and Data Mining—WSDM '18*. Marina Del Rey, CA: ACM Press; 2018:135–143.
16. Saldana J. *The Coding Manual for Qualitative Researchers*. Thousand Oaks, CA: Sage Publications; 2015.
17. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3:77–101.
18. Creswell J, Poth C. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. 4th ed. Thousand Oaks, CA: Sage Publications; 2017.
19. Malta Hansen C, Rosenkranz SM, Folke F, Zinckernagel L, Tjørnhøj-Thomsen T, Torp-Pedersen C, Sondergaard KB, Nichol G, Hulvej Rod M. Lay bystanders' perspectives on what facilitates cardiopulmonary resuscitation and use of automated external defibrillators in real cardiac arrests. *J Am Heart Assoc*. 2017;6:e004572.
20. Sasson C, Haukoos JS, Bond C, Rabe M, Colbert SH, King R, Sayre M, Heisler M. Barriers and facilitators to learning and performing cardiopulmonary resuscitation in neighborhoods with low bystander cardiopulmonary resuscitation prevalence and high rates of cardiac arrest in Columbus, OH. *Circ Cardiovasc Qual Outcomes*. 2013;6:550–558. doi: 10.1161/CIRCOUTCOMES.111.000097
21. Krammel M, Schnaubelt S, Weidenauer D, Winnisch M, Steininger M, Eichelster J, Hamp T, van Tulder R, Sulzgruber P. Gender and age-specific aspects of awareness and knowledge in basic life support. *PLoS One*. 2018;13:e0198918. doi: 10.1371/journal.pone.0198918
22. Necka EA, Cacioppo S, Norman GJ, Cacioppo JT. Measuring the prevalence of problematic respondent behaviors among MTurk, campus, and community participants. *PLoS One*. 2016;11:e0157732. doi: 10.1371/journal.pone.0157732
23. Mullinix K, Keeper T, Druckman J, Freese J. The generalizability of survey experiments. *J Exp Polit Sci*. 2015; 2:109–138.
24. Mortensen K, Hughes TL. Comparing Amazon's mechanical Turk platform to conventional data collection methods in the health and medical research literature. *J Gen Intern Med*. 2018;33:533–538. doi: 10.1007/s11606-017-4246-0
25. Huff C, Tingley D. "Who are these people?" Evaluating the demographic characteristics and political preferences of MTurk survey respondents. *Res Polit*. 2015;2:1–12. doi:10.1177/2053168015604648