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Cooling Interventions Among Agricultural Workers: Qualitative Field-Based Study

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Abstract

Introduction: Agricultural workers perform intense labor outside in direct sunlight and in humid environmental conditions exposing them to a high risk of heat-related illness (HRI). To implement effective cooling interventions in occupational settings, it is important to consider workers' perceptions. To date, an analysis of agricultural workers' experience and perception of cooling devices used in the field while working has not been published.

Methods: Qualitatively data from 61 agricultural workers provided details of their perceptions and experiences with cooling interventions.

Results: The participants in the bandana group reported the bandana was practical to use at work and did not interfere with their work routine. Cooling vest group participants agreed that the vest was effective at cooling them, but the practicality of using the vest at work was met with mixed reviews.

Conclusion: The findings of this qualitative study support and extend existing research regarding personal cooling and heat prevention research interventions with vulnerable occupational groups. Personal cooling gear was well received and utilized by the agricultural

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workers. Sustainable heat prevention studies and governmental protection strategies for occupational heat stress are urgently needed to reduce the risk of heat-related morbidity, mortality, and projected climate change health impacts on outdoor workers.

Keywords

agricultural workers; cooling interventions; heat-related illness; nursing

Adverse health effects among agricultural workers due to chronic heat exposure have been characterized in the literature as not only due to high ambient temperatures but also due to intensive manual labor in hot and humid conditions. The number of days with minimum temperatures above 75°F has doubled in the U.S. Southeast as compared to average temperature from 1901 to 1960, and it is projected to have longer summer heat waves (U.S. Global Change Research Program [USGCRP], 2018).

Florida currently has no heat illness prevention regulations, and studies have reported agricultural workers suffer from heat-related illness (HRI; Mac et al., 2017; Mix et al., 2018). In addition, 83% ($n = 198$) of enrolled agricultural workers in a study reported one or more HRI symptoms while working and continued to work at moderate-to-vigorous activity under dangerously hot environmental conditions (Mix et al., 2019; Mutic et al., 2018).

A few empirical studies have assessed the impact of cooling interventions on mitigating the adverse health effects of occupational heat stress in agricultural workers (Bodin et al., 2016; Choi et al., 2008). Agricultural workers wore 3 L backpacks with water, rested 15 min every hour under a canopy that was moved through the field, and used an ergonomic machete for cutting sugarcane (Bodin et al., 2016). Postintervention results suggested a decrease in HRI symptoms such as muscle cramps, headaches, nausea, dizziness, and disorientation among workers (Bodin et al., 2016). In Korea, 12 participants were randomized to multiple cooling interventions that included bandanas, hats, vests, and combination groups of bandanas, hats, and vests (Choi et al., 2008). The participants simulated red pepper harvest picking in a climatic chamber (WBGT33°C) for 120 min (two bouts of 50-min work with a 10-min rest). The combination cooling devices groups had no participants with rectal temperatures of $\geq 38^\circ\text{C}$, while the groups with one cooling device and the control groups did have participants exceed the threshold of $\geq 38^\circ\text{C}$ (Choi et al., 2008). None of these studies interviewed workers to understand their experience of cooling devices.

To implement effective cooling interventions in occupational settings, it is crucial to consider workers' perceptions. We followed an emic/etic model, distinguishing qualitative (emic) interpretation of self-perception reports of participants from the quantitative (etic) scientific analysis of health care professionals and researchers. Understanding of the workers' perceptions is necessary, as interventions may be effective in reducing HRI, but if they are not acceptable to workers and their culture there is little likelihood that there will be widespread adoption (Lowe & Archibald, 2009; Santos-Lozada & Martinez, 2018). To date, an analysis of agricultural workers' experience and perception of cooling devices used in the field while working has not been published. This article describes qualitative features of a mixed methods study that piloted cooling interventions for agricultural workers

aimed to reduce workers' experiences of HRI. This is the emic study, and the etic study is elsewhere (Chicas et al., 2020).

Method

This study involved community-engaged research conducted in partnership with the Farmworker Association of Florida (FWAF). In April–May of 2018 and 2019, we conducted pilot studies in Homestead and Pierson, FL, to examine workplace personal cooling gear interventions that could prevent HRI without interfering with work routines. To qualitatively explore agricultural workers' perceptions and experiences with cooling interventions, we conducted exit interviews with participants randomized to cooling interventions. The institutional review board at Emory University provided approval for the study and all participants provided informed consent. Each participant received a US\$50 gift card for their participation.

We draw upon emic perspectives for a qualitative inquiry into the agricultural workers' perceptions and experiences with cooling interventions. We use the method of hermeneutic phenomenology where researchers attempt to reconstruct participants' experience (phenomenology) through interpreting what they say in reporting their perceptions (hermeneutics; Fernandez & Zahavi, 2020; Missel & Birkelund, 2020). In social sciences, emic approaches provide ways to listen to the voices of participants with empathy to get an insider and embodied perspective, in distinction from etic approaches of scientific researchers analyzing information about research subjects from the outside as disembodied neutral observers (Hatala, 2011; Hoare et al., 2013). By soliciting participants' appraisal of the interventions, we sought to test the acceptability and usefulness of them from an emic perspective that can complement the etic interpretation of the research team. Hermeneutic phenomenology through dialogue with research participants is necessary in light of advancements in postcolonial and antiracist work in scientific research, where frameworks need to appreciate culture and identity are “fluid and complex, historically situated,” and constructed and expressed through discourse (Mohammed, 2006).

We enrolled agricultural workers for a baseline visit, followed by one preworkday and one postworkday visit. All participants identified as Hispanic. The majority of the participants were fernery workers ($n = 35$), followed by nursery workers ($n = 34$), and the remainder were field crop workers ($n = 10$) or landscape workers ($n = 5$). Fifty-five of the participants (66%) identified as female. Workers were randomized to one of the four groups: (1) no intervention, clothing as usual; (2) cooling bandana; (3) cooling vest; and (4) both cooling bandana and cooling vest. Cooling gear used in this pilot were (1) the HYPERKEWL™ Evaporative Cooling Hybrid Elite Sport Vest and (2) the Chill-Its® 6700CT Evaporative Cooling Bandana (Ergodyne, St. Paul, MN). The vest uses phase change material (PCM) cooling to reduce heat stress. Participants were instructed to place the first set of PCM inserts in the vest prior to wearing it and then remove them at lunchtime or once inserts had melted and replace with the second set of PCM inserts. The manufacture indicates that PCM inserts' cooling effect should last about 3–4 hr. This vest was chosen as it uses PCM technology, which is the same technology used in field-based studies with construction workers (Chan et al., 2017; Zhao et al., 2018). The second type of gear was a cooling

bandana constructed from reusable, affordable, and easy-to-use polyvinyl acetate material. Participants saturated the bandana in water for 1 min to activate it, twirled it to remove excess water, and tied the bandana around their forehead or neck, repeating as needed to reactivate cooling properties of the bandana. At the end of their workday, participants returned to the office where a FWA staff member conducted an exit interview in Spanish. Example questions included: “Was the time it took to put on the cooling equipment acceptable?” “Was it practical to use it at work?” and “Did you feel comfortable using the cooling device?” Questions about workers’ perspectives of current employer implemented heat protection practices included: “What practices does your company currently have to protect you against heat stress?” and “What other practices do you think your company should implement to protect you against heat stress?”

Interviews were recorded and transcribed verbatim. For those who declined to be recorded, notes were taken by hand. After the interviews were transcribed, we reviewed all responses and initially coded data to identify categories and patterns. Next, we reviewed the results of initial coding and consolidated the most significant categories into key themes to conduct a thematic qualitative analysis of the participants’ responses and narratives (Vaismoradi et al., 2016). The key themes identified through that process were categorized in the following code terms: device_practicality (practicality issues related to using devices while working, interfering with work routine, comfort of using devices) and device_effectiveness (perceived effectiveness of maintaining workers’ cool). For current and proposed work heat protection practices, the following code words were used: current_protections (current work heat protections practices), needed_protections (heat protections practices workers believe would protect them against heat stress), and barriers_protections (barriers to work heat protections practices).

Results

The following results from the exit interviews describe the five major themes related to the practicality and perceived effectiveness of the cooling devices, workers’ perspectives of current employer heat protection practices, and proposed heat protection practices workers think would help mitigate heat stress exposure. A total of 84 workers were enrolled and 78 participants completed the cooling intervention workday. A total of 61 participants provided exit interviews. Of these, 14 were in the bandana group, 15 in the vest group, 20 in the combination group, and 12 in the control group. The majority of the sample was female (66%), the mean (standard deviation) time working in agriculture was 17 (9) years, and the average level of education was 6 (3) years (Table 1). The quotations are identified by participant sex (M = *Male*; F = *Female*), primary industry, and age.

Practicality and Effectiveness of Cooling Bandana

The bandana group participants reported the bandana was practical to use at work, did not require excessive effort, and did not interfere with their work routine. Participants reported time to set up bandana was acceptable. They saturated the bandana two to eight times during the workday with water located nearby or from the bathroom facility. All participants in the bandana group reported the bandana was comfortable to wear while working. The bandana

was worn all day and many participants arrived with the bandana still on. Participants in the bandana groups found the bandana kept them cool while working.

Yes. It was fast, just soak it and ... [makes a move to tie].

(f, nursery, 39)

It was easy, because I carry water and I wet it [bandana] right there.

(f, field crop, 36)

I didn't feel it bothered me at all.

(f, fernery, 51)

You don't feel you are suffocating from the heat.

(m, nursery, 48)

Two of the 14 participants in the bandana group reported that access to water to resaturate the bandana was far from their work area. Even so, one of these participants reported resaturating three to four times and the other five to six times during the workday.

It wasn't that easy because the bathrooms are far away where I can get water.

(f, nursery, 50)

As these examples illustrate, access to water used for re-soaking cooling bandanas depends on the workers' work setting. Fernery and field crop workers work in relatively isolated areas and often bring their own water to have by their sides as they work. Nursery workers labor in more formal facilities where they have to use a restroom for access to water to re-soak their cooling bandana. Often, they have to wait for a break or be working closer to the bathroom to soak their bandanas.

Practicality and Effectiveness of Cooling Vest

Cooling vest group participants agreed that the vest was effective at cooling them, but the practicality of using the vest at work was met with mixed reviews. One participant said the time it took to switch the cooling inserts was long and not acceptable. Six of the 15 participants in the cooling vest group indicated the cooling inserts melted fast which caused the vest to feel heavy and uncomfortable to wear. However, they were all in agreement that the vest did keep them cool before the inserts melted. Several participants suggested the vest to be used only during periods when the temperature is very high to help recover from heat stress and cool them down.

Basically, the ice lasted an hour. The moment the ice melted ... its heavy and you can feel the weight ... But wow, an effective way to keep us cool in this heat. It feels quite pleasant on the body.

(m, nursery, 32)

It did [interfere with the job routine] a little because we were bending, and you feel some extra weight. I liked it, but to use it in some moments, not all day.

(m, nursery, 38).

Practicality and Effectiveness of Cooling Bandana and Vest

Twenty participants were randomized to wear the cooling bandana and the vest. Most of these participants agreed the interventions were effective at keeping them cool. The majority of this group's participants reported that the cooling bandana and vest were comfortable and practical to use at work although the vest was uncomfortable once it melted.

Well, I not only liked it, I loved that it kept me cool. With this heat I felt relief. I would like to continue using it more often. If you wear that vest it helps a lot, because it keeps you cool from the back and the front. Then the bandana helps a lot.

(m, landscape, 31)

When the ice runs out, it feels hot. Then you have to go to change the ice so that it feels cool again, because it has something that heats up too much. I don't know if it's the plastic, since it's not frozen.

(f, nursery, 32)

The bandana was not used by two participants; one said she did not have access to water to resaturate and the other said, "since I don't sweat much, I didn't use it [bandana]" (m, nursery, 46). Two participants reported using both interventions for only 10 min since they perceived the weather temperature was not hot enough to use the cooling devices. The remaining 14 participants used both cooling interventions and resaturated the bandana multiple times without any barriers to water access. Interestingly, three participants reported the vest provided back support and alleviated symptoms of muscle strain.

When your back feels tired after a while, it [vest] actually feels pretty good on your back.

(f, nursery, 46)

Current Occupational Heat Protection Practices

All participants including those in the control group were asked what heat protection practices are currently in place at their jobs. The majority responded with "nada" ("nothing"). Some workers reported their employer occasionally provides cool drinking water and ice. Others said their supervisors tell them to "take it easy" or take the day off if it is too hot. However, no worker reported an official employer-implemented heat protection plan that provides a systematic guideline for drinking water or policy for taking breaks in the shade when the temperature reaches certain levels.

Just when we look bad, they [supervisor] tells us, "better get out and sit over there until you feel better. If you feel better come back in. If not, just stay there."

(f, fernery, 46)

Worker Recommended Occupational Heat Protection Practices

When participants were asked what practices they thought employers should implement to protect them from heat stress, the primary answer was rest breaks followed by the provision of water, shaded areas to rest and have lunch, personal cooling gear interventions, and

heat stress prevention training and emergency aid training for heat stroke. Participants also mentioned that having rest breaks in the shade each hour would increase productivity.

More breaks.

(f, field crop, 49)

Well, like that cooling vest, a good hat, a bandana, water to wash our hands, soap for when we go to eat and water to drink—separate from the water for our hands; portable toilets, which sometimes we don't have.

(f, fernery, 50)

I believe that companies should give more information to workers, so we know—because people do not know how to react, when a person has heat stroke. They should train the crew leader to give people first aid when they see them sick. But if he [crew leader] doesn't know, then neither do the workers.

(f, fernery, 42)

Increasing the rest time, would reduce the working time, but even when the worker rests more, it is beneficial because the body recovers, with about 15 minutes it recovers a little. You start again and go again, but if work is constant, there comes a time when it throws you off, and the body feels it. Everyone says it, the body feels it in the afternoon. You don't work the same as in the morning.

(m, landscape, 36)

Some workers expressed they didn't think there was anything that could be implemented to protect them from heat stress.

Well, working in the field is not easy to protect yourself from heat. Nothing can be done in the field.

(m, fernery, 48)

However, fernery workers, who are compensated by piece rate, were hesitant about heat illness regulation that would require workers to take breaks that could negatively impact their wages.

Well what we think about, since we are paid very little by the [fern bunch], we have to hurry to make what we can that day. That is why many people do not want to go out to rest for a little while, in order to earn something, because it is very low paid, very cheap, and that's why.

(f, fernery, 43)

Barriers to Occupational Heat Protection Practices

Barriers to implementing occupational heat protection practices are the piece rate compensation system, a lack of interest from employers, and a lack of regulations to protect them.

... when they need ferns, we have to work, no matter if it is hot, because we work for the piece, not by the hours.

(f, fernery, 50)

I feel that in the years that I have been working, that there is not much attention to us, who dedicate ourselves to cutting fern here. That is, for the employer, his interest is profit, not the people. They don't worry about people.

(m, fernery, 48)

The lack of good will by employers to implement the Occupational Safety and Health Administration's (OSHA) water, rest, and shade recommendations is another barrier which participants said could only be implemented through regulations.

If it were law, it would be better, because there are places that the heat is extreme, unbearable that you can't stand it, but need makes you work in that heat.

(f, crop, 49)

Discussion

This study provides insight into research that evaluated personal cooling device use among agricultural workers in Florida. We developed a cooling intervention study that focused on active cooling through individual use of cooling devices as a method to protect workers from heat stress. During semistructured interviews at the postworkday visit, we assessed workers' views on the practicality and effectiveness of the cooling devices.

The bandana group had the most positive responses to an intervention. While the vest and the combination group reported some discomfort with the vest, most agreed the cooling vest did help to cool them and was comfortable. These findings are consistent with the results of international studies in various industries with outside workers who reported that cooling bandanas and vests were comfortable and effective (Chan et al., 2017; Choi et al., 2008; Shirish et al., 2016). However, it is important to note that in those studies the trials lasted between 90 and 120 min (Choi et al., 2008; Shirish et al., 2016). In a third study, workers only used a cooling vest during their scheduled work breaks (Chan et al., 2017). In our study, the workers wore the cooling interventions while working on one workday and without having regularly scheduled rest breaks. The vest was reported by a few workers to be uncomfortable and heavy once it melted, which suggests that using a cooling vest may be better suited to use during rest breaks. However, the challenge for agricultural workers in Florida (as in many parts of the country and the world) is that regularly scheduled rest breaks are not implemented by agribusiness nor government bodies. This keeps workers vulnerable to heat stress.

Agricultural workers are aware that they are uniquely vulnerable to heat stress and most are willing to use personal cooling devices to prevent heat stress, contrary to popular belief (Corcoran, 2002). However, the cost of purchasing cooling devices is not perceived to be within their financial reach. Piece rate compensation is another factor that makes agricultural workers vulnerable to heat stress because it pushes workers to forgo rest breaks in the effort to maximize the amount of daily compensation, as was voiced by piece-rate workers in our study. This observation is consistent with other studies (Faucett et al., 2007; Holmes, 2013; Wadsworth et al., 2019). Employers, however, frame piece rate compensation as a system

that provides workers with autonomy to pace themselves, take breaks as needed, and start and stop work at any time (Wadsworth et al., 2019).

Between 2000 and 2010, 29% of occupational heat-related deaths in the United States occurred in the Southeast, with the highest rates found in Hispanic male agricultural workers (Gubernot et al., 2015). Looking ahead, it is projected that extreme heat in the southeast region will result in an average annual loss of 570 million labor hours (USGCRP, 2018). Studies in the Southeast have reported that agricultural workers suffer from multiple HRI symptoms (Fleischer et al., 2013; Mix et al., 2018; Kearney et al., 2016; Luque et al., 2020; Mac et al., 2017; Mirabelli et al., 2010).

Despite OSHA's heat illness prevention campaign promoting water, rest, and shade, studies show workers continue to experience HRI at concerning rates. This campaign is in addition to Section 5(a)(1) of the Occupational Safety and Health Act (1970), which states that employers are required to provide a workplace that "is free from recognizable hazards that are causing or likely to cause death or serious harm to employees." This general clause, however, does not provide specific federal protection standards against the hazards of occupational heat exposure nor does it require employers to have a heat protection plan implemented for their workers. As such, the average annual heat-related death rate among agricultural workers is nearly 35 times greater than that of other industries (Gubernot et al., 2015).

Workers' access to water needed for soaking cooling bandana is likewise dependent on their work setting. Fernery and field crop workers work in relatively isolated areas. Bringing their own water and keeping it close to them throughout their workday is not uncommon. Since they also usually get paid by piece rate rather than by the hour, they sometimes push themselves to higher levels of exertion before they realize they need a break. However, even in this intense-paced setting, they should still have water more readily available through the agro-business or employer. Nursery workers, on the other hand, work in more closely supervised environments, with scheduled breaks for which they wait to rest and use the restroom. Nurseries are also more likely to have built bathrooms with running water as well as more formal breakrooms. While nursery workers may have access to drinking water, their access to running water to soak their cooling devices depends on their proximity to the bathroom.

In light of the existential and global threat of climate change, outdoor workers, such as agricultural workers, are at the forefront of being adversely impacted. It is critical that labor protection policies and occupational policies be implemented at the federal level to promulgate much needed protections for vulnerable occupational groups such as agricultural workers. NIOSH has evaluated scientific data on heat stress and the effects of working in hot environments to make recommendations for OSHA to adopt heat-protection standards in 1972, 1986, and in 2016 (NIOSH, 2016). In 2018, the Centers for Disease Control and Prevention (CDC) reviewed 25 outdoors HRI cases (14 resulted in fatalities) investigated by OSHA and recommended that extra precautions should be implemented when heat index reaches 85°F instead of the current OSHA recommendation heat index of >90°F (Tustin et al., 2018). Yet, no federal specific heat-protection standards exist. OSHA's resistance to

implement heat-protection standards despite overwhelming evidence that outside workers are experiencing and are projected to have even higher rates of heat stress calls for mitigation policy intervention. Public health professionals should actively engage with policy makers to implement regulations that protect the health and well-being of vulnerable occupational groups.

Further, these protections need to be implemented with enforcement mechanisms as well as follow-up requirements to help keep producers and government agencies accountable. Educational requirements for workers but especially for growers, owners, and supervisors should also be included as part of the protections written into policy. While the implementation of protections in California has been in place since 2005, a recent report contends the lack of enforcement and follow-up on violations continue to leave workers at risk (California; Goggins, 2019). Additionally, workers' perceive these protections as merely requirements growers must fulfill to avoid further government regulation, intervention, or litigation without any intent of actually maintaining worker safety or educating themselves and workers about heat-related risks (Wadsworth et al., 2019). While the establishment of protections in California—such as nighttime working hours, shaded work activity areas, rest breaks in the shade, access to water, and mechanical aids aimed at reducing strenuousness tasks—has alleviated risk of heat stress, those implementations have not been widespread (Jackson & Rosenberg, 2010). Given the limitations individual states face in inspecting, enforcing, and educating safety measures to protect workers, a more concerted effort is needed to better protect agricultural workers nationwide, such as health and safety inspections by a commission of occupational health care professionals.

Implications for Research

Evidence-based research is needed on heat stress protection interventions including personal cooling gear, heat stress prevention training, and emergency aid training for heat stroke. The findings of this qualitative research revealed that personal cooling gear was well received and largely utilized by the workers. An important factor to conduct better field-based research is partnering with the agricultural sector to engage in research at agricultural worksites. Attitudes about cooling gear is a research area still in need of further study that should include health behavior intervention. Barriers such as implementation cost for the industry as well as the cost for individual workers are concerns the participants expressed. Future studies should analyze these attitudes to find whether cost is the only barrier preventing more widespread adoption of those measures by the industry. Cooling bandanas, for example, were US\$5 each, but their usefulness and acceptability depended on ready access to water.

Implications for Practice

At the individual level, rural and occupational nurses should assess workers' occupational heat prevention practices. Nurses should also provide education on methods to prevent HRI and recognize early signs and symptoms of HRI and on initiating treatment by moving an affected worker to a cool location to rest and ingest electrolytes (Becker & Stewart, 2011). At the sector level, occupational health nurses should also work with employers to implement a heat acclimatization plan for all new employees (Becker & Stewart, 2011). In

addition, crew leaders and supervisors should be trained on recognizing signs and symptoms of heat stroke and to initiate on-site cooling by moving an affected worker to a cool location, beginning cold water immersion, or applying ice on the groin and axillae. Moreover, they should be prepared to call for emergency medical attention (Pryor et al., 2015). At the national level, nurses have a responsibility to collaborate with public policy officials to help officials understand the impact of climate change on human health as well as the lack of regulatory protections for vulnerable occupational groups. In this way, together they can propose corrective policy action.

Conclusion

The findings of this qualitative study support and extend existing research regarding cooling and HRI research interventions with vulnerable occupational groups (Chan et al., 2017; Choi et al., 2008; Shirish et al., 2016). The cooling interventions were well received and utilized by the agricultural workers. The additional insight gained from understanding agricultural workers' experience and perception of cooling devices highlights the benefit of engaging community members and suggests the potential of cooling interventions to prevent HRI. Sustainable HRI prevention studies and governmental protection strategies for occupational heat stress are urgently needed to reduce the risk of heat-related morbidity and mortality and projected climate change health impacts on outdoor workers. The lack of federal heat prevention regulations in the 21st century to protect vulnerable occupational groups who are primarily people of color and immigrants continues the pattern of disregard and denial of the harsh working conditions suffered by communities of color and immigrants (Derickson, 2019). Heat-related morbidity and mortality is preventable, and vulnerable occupational groups merit protection.

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Table 1. Demographic and Work Environment of Hispanic Agricultural Workers by Intervention Group.

Demographic	mean (SD) % (n) median [Q1, Q3]					
	Overall (n = 84)	Control (n = 17)	Bandana (n = 20)	Vest (n = 20)	Combination (n = 21)	
Age	42 (9)	42 (9)	45 (8)	41 (9)	43 (7)	
Female	66% (55)	82% (14)	60% (12)	55% (11)	62% (13)	
Years of education	6 (3)	6 (3)	7 (3)	7 (4)	7 (4)	
Work						
Years worked in agriculture	17 (9)	17 (9)	20 (7)	13 (10)	13 (10)	
Agricultural work type						
Fernery	42% (35)	47% (8)	40% (8)	45% (9)	38% (8)	
Nursery	41% (34)	35% (6)	45% (9)	30% (6)	48% (10)	
Crop	12% (10)	6% (1)	15% (3)	15% (3)	9% (2)	
Landscape	6% (5)	12% (2)	0 (0)	10% (2)	5% (1)	
Hours worked per day	7:40 [6:10–9:00]	7:50 [6:10–8:30]	8:10 [6:10–8:30]	8:40 [6:30–9:20]	8:00 [6:00–9:00]	
Environment						
Ambient Temperature, (°F) max	85 (3)	85 (2)	85 (2)	86 (3)	84 (3)	
Relative humidity, (%) max	84 (10)	83 (11)	82 (11)	83 (11)	84 (8)	
Heat index, (°F) max	88 (4)	89 (4)	88 (4)	89 (4)	86 (5)	