



Oregon Institute of
Occupational Health Sciences

2014 Summer Intern Poster Session

Abstracts

A message from our director.



Today we celebrate the diversity and depth of basic science and applied science at the Oregon Institute of Occupational Health Sciences, and from my perspective it is one of the annual highlights of our Institute. Just a couple of months ago we welcomed our latest group of summer interns: 14 undergraduates were selected from a vast field of 175 applicants and they are to be congratulated on that achievement alone. Beyond that, as you

will find out from discussions at the interns' posters, these students have learned a lot in these 2-3 months. Good science cannot be rushed, and by distilling a project into a brief 12 week period, our interns have been thrust into the paradox of carefulness and speed, and have emerged challenged: successful in some trials, frustrated in others. A brief summer project will hardly ever reveal a completely new finding, but we all move towards a goal in an incremental fashion, and every step counts. So every intern should feel a strong sense of achievement because of what they have learned and because of how they have helped our mission as we all strive to make significant contributions to human safety, health and wellbeing. Going forward, I hope that some interns will have been fascinated by the unpredictability of science, by the excitement of thinking up a hypothesis and how to test it, by sifting through the often complex and confusing data, and by the importance of the results. I hope that those individuals will be inspired to continue our work at the intersection of the workplace and wellbeing.

Steven A. Shea Ph.D.

Steven A Shea, Ph.D.

Director, Oregon institute of Occupational Health Science



Aviva Browning Lewis & Clark College Kent Anger Lab

Developing a new method for delivering computer-based safety training to workers with limited or no computer experience

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Introduction

The United States agricultural workforce consists largely of Latinos with limited education and computer experience. Agricultural workers suffer high accident rates, so training effectiveness is critical in this population. The computer-based training software, cTRAIN, coupled with a simplified keyboard replacement termed the 9BUTTON, has been used to present safety training to agricultural workers with positive results (effect sizes 0.9 and above). However, 9BUTTONs are expensive and serve only one purpose. This study examines the presentation of safety training effectiveness using a tablet versus a computer + 9BUTTON for the same audience.

Methods

In phase I (piloting), tablet user instructions were developed using serial testing in 13 vineyard workers (mean 5.7 years of education). Participants were closely observed as they proceeded through the instructions, and then were asked for feedback. This led to extensive revisions in the tablet instructions. In phase II (confirmatory study), 16 vineyard workers (mean 10 years of education) took two different segments of Hazard Communication training. Nine participants received training first on the tablet followed by the computer + 9BUTTON. This sequence was reversed for the other seven. The time to complete the user instructions, trainee reactions to the devices, researcher observations of the ease of use of the devices, and training test scores were compared between trainings taken on the tablet versus the computer.

Results

The results are described in the poster.

Discussion

The poster discusses the potential effectiveness of tablets in training delivery for Latinos with limited education and computer experience, as well as future changes in the cTRAIN interface for improved tablet training.



Jami Cheng

Johns Hopkins University

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Work, Food, and Apprentices: Evaluating an Online Nutrition Training

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Introduction

Total Worker Health™ (TWH™) is a strategy that integrates health protection with health promotion to prevent worker injury and illness. Construction workers, especially apprentices, are at increased risk for injuries on the job. Although, training for apprentices typically includes information addressing safety at the workplace, little information is provided on health promotion topics. The Bureau of Labor and Industries (BOLI) partnered with OHSU to develop an online nutrition training specifically designed for apprentices. Training addressing the impact of healthy eating on performance, nutrition, and shopping on a budget was developed for apprentices who often have a limited budget. The training was presented to a cohort of apprentices and changes in knowledge evaluated.

Methods

The online survey and computer-based training was developed and administered through SurveyGizmo and cTRAIN. Training topics included: why nutrition matters, eating a well-balanced diet, shopping on a budget, and hydration. A pre-test assessing knowledge was administered followed by the online training and then a post-test. Participants were apprentices recruited through BOLI. Microsoft Excel and Stata were used to analyze the knowledge change from pre- to post-test.

Results

Fourteen apprentices participated in the study. All participants were male with an average age of 28 (SD = 7.2). Most participants report consuming less than three servings for fruits and vegetables a day, less than the recommended serving of at least five fruits and vegetables per day. Seventy-nine percent of the participants had self-reported BMIs in the overweight or obese categories. The median knowledge score after training was estimated to be 13.6 (95% CI: 6.4--15.9) percentage points greater than the pre-test score ($p=0.0015$, signed-rank test).

Conclusion

The online training led to increased nutrition and knowledge related to healthy eating in the apprentices. The survey also indicated a need for nutrition training. The online training will be further evaluated in a randomized controlled study. This training is the first step of introducing the apprentices to TWH™ and helping them recognize that their health is linked to their job performance.



Devin Christiansen Portland State University Kent Anger Lab

Value of a Treadmill Option for Call Center Workers at Sit-Stand Desks

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Introduction: Sedentary behavior is a growing risk factor for the modern workforce. Reducing sedentary time, by utilizing a standing workstation, is associated with improved mood, lower mortality rates, and a reduction in bodily pain. The purpose of this study was to evaluate the effects on reaction, mood, and health of Emergency Call Center employees who were provided a treadmill for optional use at their workstations.

Methods: This study took advantage of a natural experiment offered by Emergency Call Center management, who sought to determine if the addition of the treadmills would have an impact on their employees' health. Measures were taken before the treadmills were made available as well as at 2 and 4 weeks after.

Results: The Call Center sample who volunteered for this study proved to have a higher prevalence of overweight personnel and obesity than the US population ($p=0.04$), and the prevalence of hypertension was observed to be high though not significantly so as compared to US normative data ($p=0.45$). Employees queried at 4 weeks after receiving the treadmill indicated liking the addition: 95% would "recommend the treadmill to others." At four weeks the sample reported using the treadmill 13% of their time at work (~1h19m/day). Further results are reported on the poster.

Discussion: The prevalence of obesity of the Emergency Call Center sample suggests that they are at higher risk than the general US population for major health concerns. Increased sample size and a longer period of time to test this sample for changes due to use of the treadmill and increased exercise could prove more beneficial.



Leanne Hicks

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Leslie Hammer Lab

Safety and Health Improvement Program (SHIP) and Team Cohesion

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Construction workers represent an understudied population that is vulnerable to safety and health risks. This study examines the effectiveness of an intervention designed to improve safety and well-being for this population.

Objective: This study examines the impact of the Safety & Health Improvement Program (SHIP) intervention on workers' team effectiveness processes (TEP) and work life effectiveness (WLEI). In addition, workers' perceived team cohesion is expected to enhance the effect of the intervention on those outcomes. First, we hypothesized that the intervention would have a positive main effect on TEP and WLEI. Second, we expected that workers' perceptions of team cohesion would moderate the effects of the intervention on TEP and WLEI, such that these relationships would be stronger under conditions of high team cohesion for the intervention group compared to the control group.

Methods: Participants were 120 construction workers from the Portland Water Bureau. The intervention included computerized training of family supportive supervisor behaviors, behavior tracking of the supervisors' learned behaviors, and team effectiveness training. Self-report data were collected at two time points (baseline and 6 months post-intervention).

Results: The training had a significant and positive main effect on TEP scores ($\beta = 1.56, p < .05$), but not WLEI scores. The interaction between the intervention and team cohesion was significant in predicting TEP scores: in the treatment group, people with low team cohesion exhibited higher levels of TEP scores than those with high team cohesion, while the opposite was true for the control group. The interaction between the intervention and team cohesion was not significant in predicting WLEI scores.

Conclusions: Results indicate that, contrary to expectations, the relationship between the training and positive team outcomes was stronger for those in less cohesive teams. Implications for future research and practice are discussed.



Colleen Hunter

Pacific University

Ryan Olson Lab

The Relationships Between Perceived Stress, Social Support, Well-Being, Dietary Habits, Exercise and Safety Behaviors

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Introduction

Home care workers (HCWs) are predominantly low-income women who typically work alone under stressful conditions. High stress is associated with a range of health outcomes, but social support may alleviate some of these negative effects. The current study hypothesized that participants reporting higher levels of perceived stress will be more likely to report lower levels of well-being and health and safety behaviors, including eating fewer servings of fruits and vegetables and more servings of sugary drinks and snacks, exercising less often, and less frequent engagement in safety behaviors at work. Relationships between stress and social support were also explored.

Methods

The hypotheses were tested using baseline data from the COMPASS study, an ongoing randomized trial of team-based safety and health intervention for HCWs. The sample included 148 participants who were mostly female (92.30%) and non-Hispanic White (93.90%, 74.60%). Average age $M=51.70$ ($SD= 13.19$).

Results

We observed a strong and significant relationship between perceived stress and well-being, $r(139) = -.64, p < .001$. The relationship between stress and number of sugary drinks/snacks approached significance, $r(145) = .16, p = .06$. Other relationships between stress and behavioral outcomes were not significant. Social support was consistently associated ($p < .001$) with lower levels of stress, including support from supervisors, $r(143) = -.35$, coworkers, $r(143) = -.33$, and relatives, $r(143) = -.45$.

Discussion

Stress was significantly relating to well being. Other findings suggest that social support may reduce or buffer against the harmful effects of stress. However, as baseline only analyses, the direction of relationships observed cannot be determined. Future research should examine these relationships, in particular whether social support has a moderating effect on outcomes within the ongoing study.



Michael Jacobson
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Matthew Butler Lab

Does traumatic brain injury severity depend on the time of day?

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Background: Traumatic brain injuries (TBI) occur at all times of day, but how the time of injury affects outcome is not clear. Severe TBI causes much greater mortality in rats in their daytime inactive phase, but there are no data regarding less severe TBI or the common behavioral and physiological consequences. We therefore tested the hypothesis that the cognitive, motor, tactile sensitivity, and molecular effects of a mild TBI would be greater if the injury occurred during the day.

Method: Seven male rats received a unilateral mild TBI by a controlled cortical impact (3mm diameter and 2.5mm deep, impacted at 4 m/s) at either 11am (day) or 11pm (night, lights-on at 6am). Tactile sensitivity, contextual learning, and motor function were compared between the two groups 7-9 days post-injury. In an accompanying experiment, circadian rhythms in the livers of 4 female rats were measured before and after mild TBI via bioluminescent reporter of the core clock gene *Period1*.

Results: TBI significantly increased tactile sensitivity in male rats. There were no significant differences between groups in contextual learning, tactile sensitivity, or motor function. The amplitude of the liver circadian rhythm was decreased in female rats following a mild TBI. Immunohistochemistry for astrocyte and microglia responses to TBI is ongoing.

Conclusion: A mild TBI increases the tactile sensitivity in male rats whether the injury is suffered during the day or night. A mild TBI reduces the amplitude of liver circadian rhythms in female rats.



Krista Leonard Willamette University Diane Rohlman Lab

Developing an Integrated Approach to Total Worker Health Trainings: Online vs. Supervisor-Led

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Introduction: Young workers (14-24 years old) represent approximately 13% of the U.S. workforce and are at a higher risk for occupational injuries than older workers. Activities designed for health and safety training can be used to reduce risks both on and off the job. Promoting U through Safety and Health (PUSH), a web-based young worker training, incorporates health promotion and health protection principles. This study compared different activity formats (supervisor-led, online games, online videos) for 3 different health and safety topics (retail, workplace violence, and sun safety) to identify the preferred training format for safety and health information for young workers. We hypothesized that young workers would prefer online activities compared to supervisor-led activities; specifically the online games vs. the videos.

Methods: Employees of Portland Parks and Recreation's Aquatics Department were invited to participate if they were 14-24 years old. A supervisor-led activity, addressing one of the 3 topics was delivered at a staff meeting. Afterwards, employees were directed to the PUSH Tumblr website to complete two online activities and a survey.

Results: 291 participants (age: 17.81±2.07) completed the supervisor-led activities. Of these, 74 completed the online activities (Response rate: 25.43%). Employees' preference of format was determined by the topic. On a 7-point scale with 0 being neutral, the most enjoyed format was supervisor-led of sun safety (1.28±1.27), while the most learned was supervisor-led of retail (1.35 ±1.32).

Conclusion: Due to variations in preference, implementation of activities requires an integrated approach in order to be most effective.



Hilary Nichols

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Evaluating Educational Programs on Sun Safety for Oregon Young and Future Workers

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Introduction

Melanoma, the most deadly kind of skin cancer, is the 2nd most common form of cancer for people age 15-29. Furthermore, Oregon consistently ranks among the top five states with the highest rates of skin cancer. Despite this, there are few educational programs on sun safety in Oregon that target this demographic. SunWise is a free educational program for K-8 teachers developed by the U.S. Environmental Protection Agency. This evidence-based program could be a useful resource for teaching sun safety to youth as future workers, however only 10-20% of Oregon K-8 schools are registered for the program, and knowing the number of teachers who have registered does not necessarily indicate how or if it is being used in the classroom.

Methods

To address the lack of education on sun safety for young workers, we developed an online training based on the SunWise curriculum content and adapted it for an older age group. A randomized controlled trial was conducted with young workers age 14-24 employed at Portland Parks and Recreation (N=140). Additionally, to evaluate SunWise as an existing program for youth as future workers, an online survey was developed to assess the implementation of SunWise, the barriers to its use, and feedback on the curriculum for Oregon K-8 teachers who registered for SunWise between 2001-2014.

Results

Results of the randomized controlled trial show that participants who took the online young worker training based on SunWise significantly improved knowledge about sun safety compared to the control. Furthermore, this knowledge was retained for 10 weeks. In a reaction to the training, 78% of participants reported that they had learned something new. The online SunWise survey was sent to 355 public and private school teachers, and will be ongoing until mid to late September, 2014. Preliminary results of this survey (N=14) indicate that although teachers believe sun safety should be taught in school and feel SunWise is effective in teaching sun safety, there may be barriers to its use. Future evaluation of these results may work towards addressing these barriers. Only 12% are actively using the program.

Discussion

Recognizing that individuals are part of larger social systems, it is important to develop an intervention approach that targets multiple levels of influence. Providing sun safety training in schools and in the workplace will provide a greater opportunity to improve sun safety behavior in youth. The online sun safety training could be used as a tool for employers to help fill the need for a sun safety program for young workers. The results of the online SunWise survey will help us to understand how to better promote sun safety programs in the classroom, and prepare students to be healthy workers in the future. As healthy habits are more easily established in youth, it is important to educate both young and future workers about sun safety so they are better able to prevent injury and illness, as well as advance health and well being as workers.



Tiffany Nguyen
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Utilizing Bacterial Artificial Chromosomes to Detect Radiation Induced Mutations from Charged Particles *In Vivo*

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Introduction: Space exploration exposes astronauts to charged particles present in the space environment. Charged particles cause mutations, and mutations play a critical role in cancer development leading to long-term health risks. A hallmark of radiation-induced mutation is chromosome translocation. In our work, we examine the target chromosome 8 in *Aprrt* mutant mice cells by painting entire chromosomes. Here, we asked if it possible to detect radiation induced mutations with bacterial artificial chromosomes (BACs).

Methods: To further understand the types of mutational events induced with charged particles, we use a mouse model to detect autosomal mutations by isolating mutant cells from mice heterozygous for the selectable *Aprrt* locus on mouse chromosome 8. *Aprrt* null cells were isolated from mice exposed to charged Fe ions. Chromosome painting was first used to demonstrate translocations affecting chromosome 8. In a separate analysis, we used BACs containing portions of chromosome 8 and labeled with two or three different fluorophores. The BACs were hybridized onto interphase and metaphase chromosome preparations of the same cell lines used for chromosome painting.

Results: Translocations of the labeled probes on the metaphase spreads were apparent in their respective interphase nuclei of the same cell line, which validates our new approach.

Discussion: The results show that the pattern of BAC hybridization for metaphase spreads and interphase nuclei were consistent with those chromosome spreads painted for chromosome 8. Knowing the complexities of these radiation-induced mutation events leads to a greater understanding of potential health risks for future space travellers.



Silvia Plascencia

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Effect of the APPL/*Goa* pathway on neurodegeneration induced by abnormal Ca²⁺ influx

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Introduction

While Alzheimer's Disease (AD) is typically associated with amyloid precursor protein (APP) and A β plaque formation, we wish to investigate an alternate APPL cleavage form in a *Drosophila* model. In *Drosophila*, APPL (amyloid precursor protein-like) and Kuzbanian are homologues of human APP and α -secretase (cleavage protein) respectively. Kuzbanian cleaves APPL at its N- terminus to release an intracellular component that activates the *Goa* pathway. Active *Goa* may modulate transient receptor protein (TRP) activity. TRP channels are involved in calcium transport and may play a role in AD pathogenesis. We strive to elucidate the role of this pathway in conditions of abnormal calcium influx, such as AD.

Methods

We use the fly Gal4/UAS system as a useful genetic tool to drive transcription of designated genes in specific cell types. We chose to use GMR-Gal4 to localize desired gene expression to *Drosophila* retinal cells to observe degenerative effects. The driver was utilized to vary APPL expression and express a thermosensitive TRPA1 channel. Overexpression (UAS-APPL), gene knockout (APPL^d) and a control were the three variations used for APPL. The effects of varied APPL expression were behaviorally analyzed with fast phototaxis and histologically analyzed via Zeiss AxioScope 2 microscope imaging.

Results and Discussion

So far, results have not indicated a direct correlation between increased APPL and slowed neurologic deterioration after 7 days. However, it does indicate a correlation between the APPL pathway and TRP ion channel function. Flies with overexpressed APPL showed slightly improved fast phototaxis performance at 3 days, but overall decreased performance from 7 days on as compared to the control. Flies with APPL gene knockout exhibited poor fast phototaxis performance after 7 days as compared to flies with APPL overexpression. Rapid, uncontrolled calcium influx elicits a neurotoxic response, and we will continue studying this pathway by looking more closely at the role of *Goa*. We hope to discover valuable information regarding the APPL/ *Goa* pathway and its role in normal and pathogenic TRP ion channel function.



Grace Recht

Ohio Wesleyan University

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Understanding the Durability of a Total Worker Health Program™: Mixed Methods Finding

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INTRODUCTION: Law enforcement work is associated with issues (e.g., stress, shift work, sedentary jobs) that adversely impact health, safety, longevity and job performance. The SHIELD (Safety & Health Improvement: Enhancing Law Enforcement Departments) study is a randomized trial of a worksite safety and health program. The 3-month intervention achieved favorable 6-month changes compared to controls. In other settings, a similar program for firefighters resulted in durable changes. We assessed the longer-term outcomes of SHIELD by obtaining both quantitative and qualitative data.

RESEARCH QUESTION: Do 12-month quantitative findings parallel the positive 6-month outcomes, and will qualitative findings provide a richer understanding of the maintenance/durability of long term changes?

METHODS: 403 law enforcement professionals enrolled in SHIELD and were randomized by work groups into 209 control and 194 intervention participants. Intervention groups participated in 12, weekly, book-based peer-led sessions. Both intervention and controls completed written and physical testing at baseline, 6-months (written only), and 12-months. At approximately 24-months after enrollment intervention participant focus groups were also assessed. Intervention effects were determined by repeated measures models, with group by time interactions. Focus groups were transcribed and systematically searched for patterns and thematic content.

RESULTS: At the 6-month time point, intervention participants had significantly improved behaviors in several dimensions: fruit & vegetable intake ($p < .0001$), healthy eating ($p < .001$), sleep quantity & quality ($p < .005$) and personal stress ($p < .05$). However, at 12 months post-intervention, only the fruits & vegetable intake changes persisted ($p < 0.0001$). Themes concerning modeling, observability and ongoing activities relating to nutrition, and to a lesser extent physical activity, suggest a fundamental difference in sleep behavior maintenance. Although knowledge persisted for all behaviors, opportunities for maintenance influences differed among behaviors.

CONCLUSIONS: A worksite safety and wellness program can achieve durable changes in eating behaviors. However, the nature of healthy and safety behaviors and how amenable they are to social influences and other maintenance influences, may determine what means must be used to achieve durable change.



Ryan Stadnik

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Peter Spencer Lab

Seasonal variation in onset of a childhood seizure disorder

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Introduction: Nodding Syndrome (NS) is a pediatric epileptic disorder of unknown cause characterized by repetitive head nodding often triggered by food. First described in Tanzania >50 years ago, epidemic NS has occurred recently in South Sudan and Uganda. We investigated the seasonality of NS onset to identify potential risk factors.

Methods: We analyzed data from a 2014 OHSU-OSU/Uganda-approved case-control study carried out in an NS-prevalent region of Uganda (Kitgum District). Data were extracted from questionnaires administered to caregivers of 5-18 year-old subjects with NS (n=51) and seizure-free age- and gender-matched community controls (CC, n=50). Additionally, we analyzed environmental data (rainfall, crop patterns) and emergency food provision in relation to annual peaks and seasonal patterns of NS onset.

Results: Annual peaks of NS onset occurred in 2003 and 2008, in association with a brutal civil war, population displacement, and food insecurity. Contrary to the results of a 2009 CDC study in Kitgum District, the reported monthly onset of head nodding was non-random, with peaks in April and June. No associations were found for rainfall or emergency food provision. Seasonal crop planting and harvesting varied by individual plant type; peaks in onset occurred when food stocks would have been exhausted. Pesticide-coated seed for planting was eaten more often by NS than CC.

Discussion: These data support an environmental etiology for NS and provide a framework to identify risk factors for the disease. Supported by NS079276 (Spencer, P.S., PI).



Madison Trowbridge Linfield College Steven Shea Lab

Influence of recent sleep and food cues on hunger ratings

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Introduction: The timing of food intake is important for weight management, especially in populations at high risk for obesity. We discovered an endogenous circadian rhythm in hunger, in which appetite is suppressed in the morning and peaks in the evening. We are undertaking a study to determine how the circadian system and time since the last meal interact to affect hunger, which is important because night shift workers, who eat at unusual circadian times, are more likely to develop obesity. To help design that protocol, which incorporates multiple sleep periods and meals evenly spaced across 24 hours, we need to know how waking up from sleep and how the sight and smell of food might influence hunger.

Methods: Participants filled out visual analog scales of hunger immediately upon waking until an hour after breakfast and before lunch until an hour after lunch. The change in hunger was assessed in relation to time since waking from sleep and when in the presence versus absence of food.

Results: Despite fasting overnight, immediately after waking participants median hunger ratings were consistently low and did not significantly increase until 20 minutes after waking. At the lunch time meal participants hunger ratings increased significantly upon presentation of food cues.

Discussion: Our data suggest; (1) that sleep suppresses appetite and that this suppression persists for at least 10 minutes after waking, and (2) that the sight or smell of food increase appetite. These results will help inform the protocol design and the interpretation of results in our future study of how circadian and behavioral influences on hunger summate.



Jeana Yee

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Ryan Olson Lab

The Relationships of Work Demands, Perceived Stress, and Social Support on the Physical Activity of Truck Drivers

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Introduction

Commercial truck drivers have overweight and obesity rates twice that of the general U.S. population. The occupation is characterized by stressful work demands, long hours, and extended time away from home. Little is known about how stress and social support impact driver health behaviors. This project tests the hypotheses that increased levels of perceived stress and work hours will be associated with decreased levels of self-reported physical activity. We also test the hypotheses that social support from supervisors and family members will moderate the relationships between perceived stress and work hours on physical activity.

Methods

Baseline surveys were completed by drivers enrolled in the SHIFT study -- a randomized controlled trial of a weight loss and health promotion intervention for truck drivers. Drivers (n=454) were recruited from 22 terminals within five participating companies and were required to have a BMI ≥ 27 . The sample consisted of 86.6% male drivers. Average age was 47.8 years (SD = 11.37) with a mean tenure of 11.53 years (SD = 9.5) and mean BMI of 37.19 (SD = 35.03).

Results

Generalized Estimating Equations were used to test our hypotheses. Models included dispatcher as a clustering variable and company as a control variable. Neither stress nor work hours were significantly related to physical activity (B= -.02, .06, p= .110, .601), and social support factors did not moderate these relationships. However, family support had a significant direct positive relationship with physical activity (B=.01, p=.023).

Discussion

While stress and social support hypotheses were not supported, we did discover that social support from family is significantly associated with truck drivers' physical activity. This suggests that family members may be useful to involve in future research or interventions to reduce sedentary behavior among truck drivers. Further research is needed to explore how stress and work demands impact driver health.