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Associations between demographic characteristics and physical activity practices in Nevada schools

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ABSTRACT

Schools are important settings for not only providing and promoting children's physical activity (PA) but also for reducing PA disparities. We investigated associations between school-level demographic characteristics (racial/ethnic and socioeconomic composition, urban-rural status, and student-to-teacher ratio) and 16 PA-promoting practices in 347 Nevada public elementary, middle, and high schools in 2014. We found that low-cost and easy-to-implement practices are most prevalent. There is relative demographic equity in ten of 16 PA practices and significant differences in six PA practices in Nevada schools. Schools with comparatively larger percentages of Black students are the most disadvantaged, as they have the fewest PA-supportive practices in place. Higher percent black was associated with lower odds of providing classroom activity breaks (AOR = 0.632, 95% CI = 0.453–0.881) and bike racks (AOR = 0.60, 95% CI = 0.362–0.996), greater odds of withholding recess/PE for disciplinary reasons (AOR = 1.377, 95% CI = 1.006–1.885), and lower odds of having recess supervisors who are trained to promote PA (AOR = 0.583, 95% CI = 0.374–0.909). Schools with greater percentages of Hispanic students have lower odds of providing before-school PA programs (AOR = 0.867, 95% CI = 0.761–0.987), whereas schools with greater percentages of low-SES students have greater odds of providing after-school PA programs (AOR = 1.135, 95% CI = 1.016–1.268). Higher student-to-teacher ratio was also associated with greater odds of providing after-school PA programs (AOR = 1.135, 95% CI = 1.016–1.268). Urban-rural status was unrelated to all PA practices.

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1. Introduction

It is now widely accepted that schools are logical and essential settings for providing and promoting children's physical activity (PA) and for reducing PA disparities (IOM, 2013; Naylor and McKay, 2009; Pate et al., 2006; USDHHS, 2012; Zewditu et al., 2015). Schools reach nearly all children, and children spend more awake hours in schools than in any other context. All school districts participating in the National School Lunch and/or Breakfast Programs are required to develop a local school wellness policy that promotes student health and addresses childhood obesity. Despite this national law, states, and the school districts within them, differentially adopt and implement school wellness

practices, including those specific to PA (Lounsbery et al., 2011; Lounsbery et al., 2013; McKenzie and Lounsbery, 2009; Monnat et al., 2014; Slater et al., 2012; USDHHS, 2015). As a result, the presence of evidence-based PA practices varies substantially across schools (Zewditu et al., 2015).

School demographic characteristics, including racial/ethnic and socioeconomic (SES) composition, class sizes, and rurality may impact the ability of schools to incorporate PA practices into the school day, resulting in disparities that limit children's opportunities to accrue moderate-to-vigorous physical activity (MVPA). A study conducted in 97 elementary schools (Carlson et al., 2014) and one in 36 middle schools (Young et al., 2007) found that students in more affluent schools spent more time engaged in MVPA than students in low-SES schools and that low-SES schools had fewer PA-supportive practices than high-SES schools. As well, a national study found that elementary schools with greater proportions of Hispanic and Black students had inferior recess practices, playgrounds, and gymnasiums compared to predominantly White schools (Turner et al., 2010). Moreover, Black adolescents are more likely than White adolescents to attend schools with lower PA participation (Richmond et al., 2005), and elementary schools with higher percentages of non-White and low-SES students

Abbreviations: PA, physical activity; PE, physical education; MVPA, moderate to vigorous physical activity; FRL, free and reduced price lunch.

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are less likely to offer recess (Beighle, 2012). Opportunities for PA also vary between rural and urban areas, with rural residents obtaining less physical activity than their urban counterparts (Umstadt et al., 2015). A study of middle schools in North Carolina found that low-SES rural schools had fewer environmental resources for extracurricular PA than urban and more affluent schools (Edwards et al., 2013). Another national study found that elementary schools located in rural areas and towns (compared with cities) are less likely to offer recess (Beighle, 2012).

Though informative, insights drawn from these studies have been partially limited by their inclusion of only one school level (e.g., elementary, middle), their inclusion of only one group of PA factors (e.g., recess, extracurricular activities), and/or their focus on only one school-level demographic factor at a time without accounting for concomitant school-level demographic advantages/disadvantages. The current study adds to this growing body of evidence by examining associations between multiple school demographic characteristics and 16 specific PA practices in elementary, middle, and high schools in Nevada. We examined school practices related to general wellness; PE, recess, and classroom-, before-, and after-school activities; PA facilities; and support for active transport. These school practices have been shown to be associated with increased PA at school and/or are aligned with national recommendations or guidelines (Active Living Research 2011; Carlson, 2014; IOM, 2013; Lounsbury et al., 2013; Turner et al., 2012; USDHHS, 2004; USDHHS, 2009). Based on the literature cited above, we hypothesized that schools with greater proportions of demographically vulnerable students (Black, Hispanic, low-SES), schools with higher student-to-teacher ratios, and rural schools would be less likely to have PA supportive practices in place.

2. Nevada state physical activity laws

Nevada currently has no laws requiring schools to provide or promote PA, but the state school wellness policy stipulates that schools must provide opportunities for at least 30 min of MVPA during each regular school day. The state requires students to complete four semesters of PE for high school graduation, but it allows PE substitutions (e.g., interscholastic athletics, cheerleading, JROTC) for up to two semesters. Because the state does not require PE at the elementary and middle school levels, Nevada school districts fund PE differentially. Since 2012, Nevada has received Safe Routes to Schools funding, but allocates no other PA funding. With the exception of monitoring PE credits required for graduation, there is no state oversight for school PA. However, school districts are required to report their PA plan as part of the school wellness program report.

3. Methods

3.1. Data

Data were obtained from two sources. First, data on school PA practices came from a web-based survey disseminated by email from district superintendents' offices to all Nevada K-12 public school principals in fall 2014. District superintendents sent follow-up emails with the survey link to non-responding schools three times. Surveys were received from 439 of Nevada's 652 public schools (including state-sponsored charter schools) within 16 school districts/counties. Of those, 27 schools were excluded due to missing school identification, resulting in a sample of 412 schools (63.2% of all K-12 Nevada public schools).

Table 1 lists the PA practices included in this study. These variables were selected for the survey because they align with national recommendations or guidelines (e.g., having a school wellness coordinator, 150 min of PE per week, 100 min of recess per week) and/or have been shown to be associated with increased PA at school (Active Living Research, 2011; Carlson, 2014; IOM, 2013; Lounsbury et al.,

2013; USDHHS, 2009; USDHHS, 2011). Only elementary school principals were asked about recess practices.

We matched school names to data on school demographic characteristics from the U.S. Department of Education National Center for Education Statistics, 2013–2014 (U.S. Dept. of Education, 2015). The school-level demographic predictors of interest (Table 2) were: student racial/ethnic composition (percentages of Black (non-Hispanic) and Hispanic/Latino students), percentage of low-SES students (i.e., percentage of students eligible for free/reduced price lunch [FRL]), urban-centric locale codes (collapsed into city, suburb, town, and rural due to cell size concerns), and overall student-to-teacher ratio. We considered including total number of students, school eligibility for Title I funding, and school participation in the National School Lunch Program (NSLP). However, we excluded those variables from final models, because 96% of the schools in our sample participate in NSLP (resulting in cell sizes too small for analysis), total number of students was strongly correlated with student-to-teacher ratio, and eligibility for Title I funding was strongly correlated with percent low-SES students.

There were no significant differences in student racial/ethnic composition, percentage of low-SES students, or average student-to-teacher ratio between schools that did versus did not submit a survey. Schools not submitting surveys (and therefore excluded from analyses), were significantly more likely to be located in a rural area than those submitting surveys. Overall, 65 (15.8%) of surveys had a missing response on at least one PA measure. The number of surveys with a missing response ranged from 7 (1.7%) (school has a school wellness coordinator) to 36 (8.7%) (school provides before-school PA programs). There were only two systematic differences between schools with complete versus incomplete surveys; schools with missing information on at least one PA practice were significantly more likely to report that the school provides before-school PA programs but significantly less likely to report that the school has active travel plans. To ensure comparability of samples across each PA practice, and to avoid the risk of introducing significant bias into the models by imputing sixteen different outcome variables without access to strong auxiliary variables (Allison, 2012), we conducted complete case analysis (e.g., listwise deletion), resulting in a final analytic sample of 347 schools (221 elementary, 55 middle, 71 high) nested within 16 districts.

3.2. Statistical analysis

Binary logistic regression was used to determine the odds ratios (OR) and 95% confidence intervals (CI) for associations between each school demographic characteristic and each school PA practice (all dichotomous outcomes), controlling for each of the other school demographic characteristics. We also controlled for school level (elementary, middle, high) and district fixed effects (i.e., dummy variables for school districts). In addition to accounting for the clustering of schools within school districts, including fixed effects enabled us to control for unobserved district-level factors on school PA practices. We compared the results of these models with random-effects multi-level regression models, and results were consistent. Because nearly all elementary schools reported providing loose equipment (98.6%) and strategic playground markings (96.8%) for recess, we did not conduct regression analyses on these two practices.

Second, we calculated a total count of the 14 PA measures (excluding recess measures) and used ordinary least squares (OLS) regression to determine associations between school demographic characteristics and total count of PA practices, again controlling for school level and district fixed effects. The PA practice count was normally distributed (mean = 9.8; SD = 2.3; min = 2; max = 14). A comparison of the OLS model to models for count outcomes (i.e., poisson, negative binomial) indicated that the OLS model produced a better fit.

All analyses were conducted using SAS software (version 9.4; SAS Institute Inc., Cary, NC).

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