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**AN INVESTIGATION OF THE IN-PRACTICE DEVELOPMENT AND
IMPLEMENTATION OF RECESS AND PE WEATHER POLICIES
IN MAINE ELEMENTARY SCHOOLS**

By

Lauren Elizabeth Jacobs

B.A. Bates College, 2007

A THESIS

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Science

(in Kinesiology and Physical Education)

The Graduate School

The University of Maine

August 2017

Advisory Committee:

Robert Lehnhard, Director of School of KPEAT, Advisor

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An Abstract of the Thesis Presented
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The purpose of this research was to investigate how Maine elementary schools decide when students may or may not go outdoors for physical education (PE) classes and recess based on weather conditions, and how those decisions impact the actual frequency that students are kept indoors. This topic is important from both education and public health perspectives because previous research has shown that exercise in outdoor settings has specific benefits compared to that done indoors. PE classes and recess in school provide all children with access to physical activity.

A mixed-methods approach was used and included three components: a statewide survey of Maine elementary school principals, focused qualitative interviews of principals, and an analysis of school policies in the context of actual weather data. This three-pronged approach was warranted as the study was of an exploratory nature. As far as the author is aware no previous research has been completed on this topic.

The survey was sent to principals via email and completed online with a response rate of 26.6%. The potential for self-selecting bias was a possible limiting factor in the study. Three principals representing five schools from different parts of Maine participated in focused interviews that uncovered more detailed data on the study topic. The historical weather analysis was completed for six towns, two each from Maine's three climate divisions.

A statistical analysis using survey results showed a significant correlation between geographic location and minimum cut-off temperature for outdoor recess. More northerly schools were more likely to have lower minimum temperature cut-offs. Statewide, the minimum temperature cut-offs ranged from 0°F to 20°F. No relationship was found between minimum cut-off temperatures and school poverty rates. Substantial differences were found between the survey-reported number of missed outdoor recess days and the estimated numbers using actual weather data. The lowest number of estimated cancelled outdoor recess days due to cold according to historical weather data was 10 per school year at a southern Maine school with a minimum temperature cut-off of 0°F. However, this estimate does not take into account rainy days, and nearly every responding school indicated cancelling outdoor recess and PE when it is raining.

The findings of this research are important for three main reasons. First, it uncovered the vast differences in weather policies for outdoor recess and PE around the state. The reasons for these differences are complex and go beyond simple safety concerns. Second, there appears to be a general lack of understanding about how many days of outdoor recess and PE classes Maine elementary students miss due to weather. Students around the state are experiencing very different cancellation rates because there are such divergent weather policies. Finally, these findings may help Maine school administrators, teachers, and community members realize how

relatively small changes to their weather policies could impact the outdoor time available to their students.

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CHAPTER 1

INTRODUCTION

Background: Children, Physical Activity, and the Environment

Outdoor play and exercise are often seen as ubiquitous parts of childhood, things that are associated with most environments in which children move: home, neighborhood, and school. It seems to be something innately understood, though perhaps not always given due respect: children need to move and play outside.

The importance of children partaking in physical activity (PA) is not simply an assumption, it is a well-researched fact. The topic has become particularly salient to anyone concerned with the wellbeing of youth, as there is an abundance of concern about the dramatic rise in childhood obesity over the last few decades. Research shows that meeting the recommended 60 minutes per day of physical activity¹ is correlated with increased physical fitness, and a decreased risk of ailments including heart disease, diabetes, obesity, anxiety, and depression.²

Looking beyond the health benefits of PA, research shows that increased physical activity levels also have direct cognitive and academic benefits. An analysis published by Active Living Research³ shows a considerable body of work supporting the idea that academic and behavioral improvements result from increased access to physical activity. Indeed, the entirety of the 2008 book *Spark*⁴ outlined these and other research findings regarding the considerable cognitive benefits of exercise.

It is clear that barriers to sufficient daily physical activity in children remain numerous despite its importance. This fact is reflected in objectively gathered data of PA using

accelerometry which showed that in 2003 and 2004 only 42% of 6-11 year-old children in the United States were meeting the recommended daily levels of PA.⁵ A complex fabric of influences appears to impact this population-level insufficiency in PA levels. Environmental factors,⁶ school policies,⁷ geography,^{8,9} and social relationships¹⁰ have all been correlated with amounts of daily physical activity in children.

Since the benefits of PA are well-established and concern about the lack of adequate PA is prevalent, research has turned to the question of how to increase physical activity at both population and individual levels. In the fields of education and health, efforts that increase PA in children are considered to be an important, though not singular, component of addressing the issue of obesity in the United States. With this in mind we shift focus slightly to consider the effects of environmental variables on PA promotion.

One study using objective measurements of children's activity levels through the use of accelerometers showed that youth who spent more time outdoors engaged in more moderate and vigorous physical activity and were less likely to be overweight than their peers who spent less time outdoors.¹¹ Another study using accelerometers, as well as GPS tools, showed that elementary school children engage in 2.5 times more physical activity outdoors than indoors.¹² In a childcare setting, research investigating the movement patterns of preschoolers showed that they engaged in statistically significantly higher levels of PA outdoors (32 min/hr) versus indoors (14 min/hr).¹³ In line with these trends, a 2015 review of existing research showed consistent correlations between children spending more time outside and having higher levels of physical activity and cardiorespiratory fitness.¹⁴

These findings may not highlight any innate differences between indoor and outdoor locations. Perhaps outdoor time is more often set aside specifically for physical activity and

indoor time is more frequently used for sedentary activities. It is worth noting, however, differences found between indoor and outdoor PE classes, a context in which physical activity is inherent no matter the location. An observational study of 211 elementary physical education classes in Texas demonstrated that students partake in more vigorous PA in outdoor PE settings than indoor ones.⁶ A study from Poland demonstrated significantly increased endurance performance in elementary students that took part in more outdoor PE classes compared with students in a control group.¹⁵ The latter finding is particularly interesting in that it used a randomized controlled trial methodology and did not rely on causal-comparative research. Though there is much more research to be done on the environmental factors that impact physical activity, particularly regarding the potential impacts of interventions, the existing body of evidence points strongly towards a correlation between increased outdoor time and more physical activity.

Physical Activity and the Special Role of Schools

Public schools play a unique and particularly important role in providing students with access to physical activity. First, school is accessible to all American children and it is where children spend a large proportion of their waking time. Second, schools have the opportunity to approach PA promotion in a multi-pronged fashion. Before- and after-school activities, physical education classes, recess, in-school PA breaks, and summer programming opportunities can all be part of public school schedules and priorities.

These approaches to providing physical activity in schools, along with other wellness policies, are often put together and coordinated through Comprehensive School Physical Activity Programs (CSPAP).¹⁶ CSPAPs blend five essential components of PA promotion and

opportunities in schools with the ultimate goal of ensuring all students have access to adequate daily PA. Existing research and support structures such as CSPAPs have led some states, districts, and schools to implement policies mandating the existence of and time allotted for recess and PE.

In the United States, school-based outdoor active time often takes the form of recess. (Though physical education classes also provide opportunities for outdoor PA.) Recess, in the “traditional” definition of outdoor and unstructured but supervised free-play time, is a unique form of physical activity opportunity during the school day. It is often the only time in school that children can choose exactly how they play, what they play, and with whom they play. Research into the nature and effects of recess have repeatedly demonstrated its absolute importance.^{17,18} Recess provides an opportunity for students to independently gain and practice social skills and conflict resolution, as well as partake in physical activity.¹⁷

From an academic perspective, recess provides a break during a day filled with structured activities and learning, which results in increased cognitive performance and attention. This effect may be due to the benefits of distributed versus massed practice; young children in particular require breaks from intellectual activities in order to let go of accumulated nervous system “interference.”^{19(p 189)} Interestingly, research has shown that the cognitive benefits of recess appear no matter what kind of activity students embark upon during their free time. Even recess activities that are more sedentary prove to be valuable to children’s academic and cognitive performance, behavior, and focus.¹⁸ Though the myriad benefits of physical activity are still relevant, unstructured recess provides children with other crucial advantages not dependent upon PA.

However prevalent it may seem to most readers, daily outdoor recess is, in fact, not a universal part of the school experience for all students in the United States. Differences in access to daily recess correspond with geography, socioeconomic status, grade level, and school size. Students enrolled in larger and/or urban schools typically have less recess time, while students in rural schools are often allocated more.²⁰ Schools with higher poverty rates tend to schedule less recess time.¹⁸ Approximately 3.2% of U.S. elementary schools do not schedule daily recess at all, while the exact percentages differ by grade level. For example, 13.4% of schools do not offer daily recess for 5th grade students, while 9.6% do not schedule daily recess for students in the first grade.²¹ Even among schools that do provide regularly scheduled recess, a 2011 survey of a nationally representative sample of elementary school administrators showed a general downwards trend in recess time allocation; 26.5% of respondents indicated that outdoor play time had recently decreased, while only 5.3% said it had increased.²² It appears some schools choose to increase PE time while decreasing recess time,²³ despite the differing functions these two components of the school day provide.

Similarly, students attending public schools in the United States have unequal access to high quality physical education. Only 20% of U.S. schools meet SHAPE America's recommendation of 150 minutes of PE per week, a rate that is highly variable between different geographic regions of the country.⁹ A separate study showed a huge range of allocated PE time, with a reported average of 62.5 minutes per week but a standard deviation of 30.5 minutes.²³ The state of Maine, in which the present study took place, mandates the offering of PE but does not have minimum time requirements.²⁴ Clearly, PE and recess time allotments are highly variable.

A final point must be made about the important role schools play in providing all students with physical activity opportunities, particularly in relation to this study. Students living in rural

areas, of which Maine has in abundance, often have limited PA opportunities in relation to their more urban peers. This may seem counterintuitive but the longer distances between services in rural areas often means that students cannot walk or bike reasonably or safely to schools and other locations of interest. A qualitative study using focus groups from rural towns in Maine found that students repeatedly reported accessing most of their regular physical activity opportunities at school through recess, organized sports, and physical education classes.²⁵ The authors suggest that “finding ways to increase opportunities for PA at schools should continue to be a top priority for rural school administrators, policy makers, and researchers.”^{25(p 229)}

Rationale for the Present Study

As previously outlined, the benefits of outdoor play and exercise make them an important and research-worthy part of the school day. Despite the existence of considerable research into a wide variety of barriers and facilitators to physical activity, one school-based issue has not been well studied: weather policies related to outdoor recess and PE. In colder climates, including northern states such as Maine, it is common practice to cancel outdoor recess due to weather conditions. But what are the weather conditions that result in canceling recess? Who decides and what information do they use to craft these policies? If recess is cancelled, are kids still able to engage in PA? And are PE classes held to the same weather policies as recess? In the state of Maine these policies, if they exist at all, are entirely under local control. As such, there is a wide variety of policies and practices around the state. These questions are timely and currently on the minds and desks of some policy-makers at the state level. A bill put before the most recent Maine Legislature sought to mandate a minimum daily amount of 30 minutes of physical activity

opportunities for all students in grades Kindergarten through 5. The bill did not pass either the House or Senate.²⁶

The present study is an investigation into Maine elementary school weather policies as they pertain to outdoor recess and physical education classes. Using a statewide survey of elementary school principals and qualitative interviews, this study explored the existence and in-practice implementation of these policies. In addition, using historical weather data, the school weather policies in six representative schools in Maine were used to estimate how many days per school year, on average, students are kept inside for recess and/or PE.

A note is required in reference to the simultaneous investigation of recess and PE policies, a practice that risks confounding the two. The researcher is not equating recess and PE; they are very different and serve some similar but ultimately discrete functions. Both provide critical opportunities for students to access PA during the school day, though PE does so in a structured academic environment and recess does so through free-play. Most importantly for this research, both recess and PE provide an opportunity for participation in the uniquely beneficial aspects of outdoor physical activity.

CHAPTER 2

METHODS

Overview and Target Study Population

This study involved three components of data collection and analysis: a survey, qualitative interviews, and an analysis of school-based weather policies in relation to historical weather data. The target population included all Maine public elementary schools that serve students in grades Kindergarten through 5. Schools in the study could serve any combination of those grades as long as at least one was inclusive of Kindergarten through 5. This target study population was chosen because elementary schools are most likely to incorporate daily recess in the school day.²¹ Charter schools, magnet schools, or schools serving solely special-needs populations were not included. According to Maine Department of Education (MDOE) data, there were 395 schools that met the criteria.

Survey Instrument

A survey comprising 31 questions was distributed to the lead building administrator at all schools in the target population. The survey included 11 questions from the School Physical Activity Policy Assessment, or S-PAPA,²⁷ with additional original questions added to address the essential purpose of this research. Participants were not asked to answer all 31 questions. The survey, created in and distributed through Qualtrics, used display and skip logic to adjust which questions were shown based on individual participant responses. For example, only a participant that answered “Yes” to the question, “Does your individual school have a written policy

specifying under what conditions outdoor recess is to be cancelled?” would then be asked to go on to explain that policy. The survey instrument in its entirety is included in the appendix.

The school administrators received an introductory email to the research, followed by the survey in electronic form, and one reminder email to non-respondents four weeks later. School administrator contact information was found using MDOE data and searches on individual school websites. If contact information could not be found online the researcher called the school to obtain the building administrator’s email address. Where available the building principal was the administrator contacted, however some schools had a “lead teacher” or other type of administrator. When there was doubt, the researcher contacted the school to identify the lead building administrator. The survey was open and available to complete for 60 days.

Survey Statistical Analysis

Of the 395 schools that were invited to participate in the survey, 118 provided some response. Fifteen responses were removed because they were too incomplete to be of use. In two instances principals of multiple schools responded once to the survey but with answers representing both of the schools they served. Those responses were separated so that each individual school would be captured in the data, including unique free- and reduced-price lunch (FRPL) rates. This resulted in a final response rate of 26.6% and an *n* of 105.

For analysis purposes the school geographic locations were categorized into one of three Maine climate regions, as determined by the National Oceanic and Atmospheric Administration (NOAA).²⁸ Reported FRPL rates were used as a representation of school poverty. If a survey respondent left the FRPL question question blank, the researcher filled in the relevant information with the most recent data available from the Maine DOE.²⁹

Survey respondents were encouraged to explain the content of their school's outdoor recess policies in an open-ended question. A common theme in these responses was having a minimum "cut-off" temperature under which outdoor recess would be cancelled. The researcher used this data to create five cut-off categories: 0°F, between 1-10°F, between 11-19°F, 20°F, and no cut-off provided (but some other policy explained).

Temperature cut-off data, as expressed in ordinal categories, was used to run a Chi-square analysis between minimum temperature and climate division. A Spearman Rank Order analysis was run using climate division and FRPL rates. The two statistical analyses were completed using SigmaPlot version 12.5.

Interview Procedure and Analysis

Data collected in the survey responses was used to select three school administrators to participate in qualitative interviews. Interview subjects were chosen from survey respondents who indicated they would be willing to be contacted for follow-up. One interview participant was a principal at one school, and two interview participants were principals at two schools each. These interview participants were chosen to represent a reasonable breadth of target population diversity in terms of three categories:

- Geographic distribution: Interview participants were administrators at schools representing all three of Maine's climate regions (Northern, Southern Interior, and Coastal)
- Socioeconomic information: FRPL rates were used to assess this category. One interview participant represented a school with FRPL rates within one standard deviation (SD) of the Maine state average. The other two participants represented schools that had FRPL

rates more than one SD higher than the state average. Maine Department of Education data from 2017 were used to calculate SD.²⁹

- Status of school or district weather-based policies: The explicit goal of the interviews was to gather information on how weather policies and practices for outdoor recess and PE were created and being used. As such, interview participants needed to be able to articulate how decisions were made regarding outdoor recess and PE.

Potential participants were emailed an invitation letter and interview informed consent form, according to standards approved through the University's Institutional Review Board (IRB). Interviews lasted between 35-45 minutes, and took place at a location determined by the participant. They were digitally recorded and transcribed by the researcher. The content was assessed for themes and categories using an open-ended phenomenological approach to interviewing and data analysis. The process used for distilling and interpreting meaning from the data was similar to that outlined by Irving Seidman³⁰:

1. Thorough reading and highlighting sections of interest from transcripts.
2. Categorizing and organizing according to general themes.
3. Summarizing and explaining common threads and lessons learned from interviews with the use of direct quotations.

Policy and Historical Weather Analysis

The approximate direct impacts of recess and PE policies at six school locations were examined using local weather data. The number of outdoor recess and PE days cancelled due to cold weather per school year were estimated using the minimum temperature categories and 10

years of data from weather stations close to the schools' locations. The six locations used for analysis were chosen because the local schools had explicit weather policies including temperature and/or wind chill cut-offs, and they were within 7.5 direct miles from a nearby weather station with accessible data. The schools and weather stations were in the same town for four of the locations. For the other two the weather station was located in a town adjacent to the town the school was located in; Easton's weather station was in Presque Isle, and Lubec's weather station was in Eastport. Two locations from each of the three climate divisions were chosen.

Weather data from 2007 to 2017 for the six chosen stations were accessed using the National Climatic Data Center's³¹ (NCDC) online Surface Data Hourly Global archives. Daily weather observations at 12:00pm between November and April during those years were included. The data were analyzed in Microsoft Excel. The wind speeds were changed from m/s to M.P.H. and temperatures were changed from degrees Celsius to Fahrenheit, facilitating use of the National Weather Service's wind chill equation.ⁱ These calculations were completed for data points where wind speed was greater than 3 M.P.H. and temperature was lower than 50°F, the constraints within which the wind chill equation is accurate. This analysis produced an average probability that outdoor recess and PE would be cancelled due to cold according to five different wind chill scenarios.

ⁱ Wind chill = $35.74 + (0.6215 \times T) - (35.75 \times \text{Wind}^{0.16}) + (0.4275 \times T \times \text{Wind}^{0.16})$

CHAPTER 3

RESULTS

Survey Results

The survey response rate was 26.6% with an n of 105. The mean FRPL of respondents was 52.35% (SD 19.67). The lowest rate was 3% and the highest 100%. The Maine state FRPL mean is 48%.

Ninety-nine respondents (94.3%) indicated that all of their students have a daily scheduled recess. The remaining six schools answered “no” to this question and four provided explanations: one school provides daily recess for grades PK-6 but not 7-8; one has daily recess for grades PK-4 but not 5-7; one has daily recess for grades 3-5 and minimum once weekly for 6-8; and one K-12 school has daily recess for grades K-8 but not high school students. The remaining two respondents answered “no” but did not indicate which grades did or did not receive daily recess (one of those schools is K-12, one is PK-8).

When asked if students had the chance to be physically active during indoor recess, 71 respondents (67.6%) said “yes.” In an open-ended opportunity to explain their response, many administrators indicated multiple activity options during indoor recess, sometimes dependent on the particular day’s schedule. Fifty responding schools had some level of access to the gymnasium depending on the day or specific recess period, while 24 indicated some or all of indoor recess activities occur in classrooms. Sixteen specifically mentioned the use of technology to facilitate physical activity, including GoNoodle, Wii, or dance videos. Four respondents said students were allowed to walk the school hallways, and one school had a dedicated “activity room” for use during indoor recess.

Outdoor Recess and Physical Education: Weather

The survey asked if schools had written policies in place outlining when students would be allowed outside for recess and/or PE. Of those that stated they had written policies, 26 schools (24.8%) used policies that came from their district and 44 (41.9%) had a written policy at the school level. The remaining 35 schools (33.3%) did not have a formal or written policy but did have some sort of practice used to make this determination.

Nearly half (48, or 45.7%) of the responding schools stated that their weather policies for recess were the same for physical education classes. Two schools had warmer temperature cut-offs for physical education classes than for recess, and two had cooler cut-offs than recess. Among schools that did not use recess policies, 11 said they took weather into account but did not provide specifics. Five explicitly named rain as a reason to not hold PE outdoors. One school said if it is too hot they do not hold PE outdoors, though they did not provide a specific temperature. Six schools wrote that they do not hold any PE classes outdoors during winter months.

Other respondents indicated different procedures and considerations regarding weather related to holding outdoor PE classes. Sixteen schools said it is completely up to the PE teacher, and two schools said the PE teacher and principal collaborate to make the decision. A number of other variables were named including the nature of the planned activity, muddy fields, general safety concerns, and specific concerns including loose dogs and bees. A consideration for one large southern Maine school was access to adequate space outdoors, “Due to the size of our school, outdoor play spaces are typically used for recess during all parts of the school day and PE classes are [held] in the gymnasium. Occasionally PE classes are on the [outdoor] track.”

Responses varied widely regarding outdoor PE classes in winter. At a central Maine school, “Winter classes do not go outside. September or June classes might stay in if the PE teacher determines that it is too warm.” A downeast school said that, “We do indoor skills during winter months.” Some schools reported access to equipment that facilitates outdoor PE classes in the winter months. For example, a southern Maine school wrote that, “Our PTO [Parent Teacher Organization] purchased cross-country skis and snowshoes for our kids, so we love going out.” In another instance, “We do a unit on [cross-country] skiing, so that is dependent upon snow conditions rather than weather.” At a PK-8 school in western Maine, “The curriculum drives the outdoor activity and includes Nordic [cross-country] skiing, snowshoeing, and ice skating.” These activity-based decisions are left up to the PE teacher.

Temperature Cut-offs, Geography, and FRPL Rates

Of the 105 respondents, 91 (86.7%) provided some sort of minimum temperature cut-off as part of their outdoor recess and/or PE policy or practice. Nearly all of these temperature cut-offs included wind chill, relative outdoor temperature, or Accuweather.com’s “RealFeel®” index.ⁱⁱ For the purposes of statistical analysis, the lowest reported temperature cut-off was used no matter what additional index or factor was taken into account. These schools were placed in five categories (Table 1). These temperature cut-offs, under which outdoor recess (and sometimes PE) were cancelled, were used in two statistical analyses. The 5th category, which was not specific, was not included in these analyses.

ⁱⁱ The RealFeel® index used by Accuweather.com is a proprietary equation that takes into account a number of variables beyond air temperature and wind, including humidity, cloud cover, the position of the sun in the sky, and the intensity of the sun. The equation used is patented and the name is a registered trademark.

Table 1. Criteria and sample size for temperature categories.

Category	Minimum Cut-Off	Number (and %) of Schools in Category
1	0°F	15 (14.3%)
2	1-10°F	46 (43.8%)
3	11-19°F	22 (21.0%)
4	20°F	8 (7.6%)
5	Other*	14 (13.3%)

* = Policy/practice did not include temperature

The first analysis assessed the relationship between temperature cut-off category and FRPL rates in a Spearman rank order correlation. No significant relationship was found; the correlation coefficient was -0.0599 (P = 0.572).

The second analysis (Table 2) used Chi-square to assess the relationship between temperature cut-off category and geography, as represented by NOAA climate divisions. The relationship was statistically significant with a Chi-square of 32.662, with 6 degrees of freedom (P = <0.001). The geographic and temperature category correlation is evident when the represented schools are plotted on a map of the state (Fig. 1).

Table 2. Number of schools in each temperature category per climate division.

Climate Division	Temperature Category			
	1	2	3	4
Northern	6	2	0	0
Southern Interior	4	33	11	2
Coastal	2	11	11	6

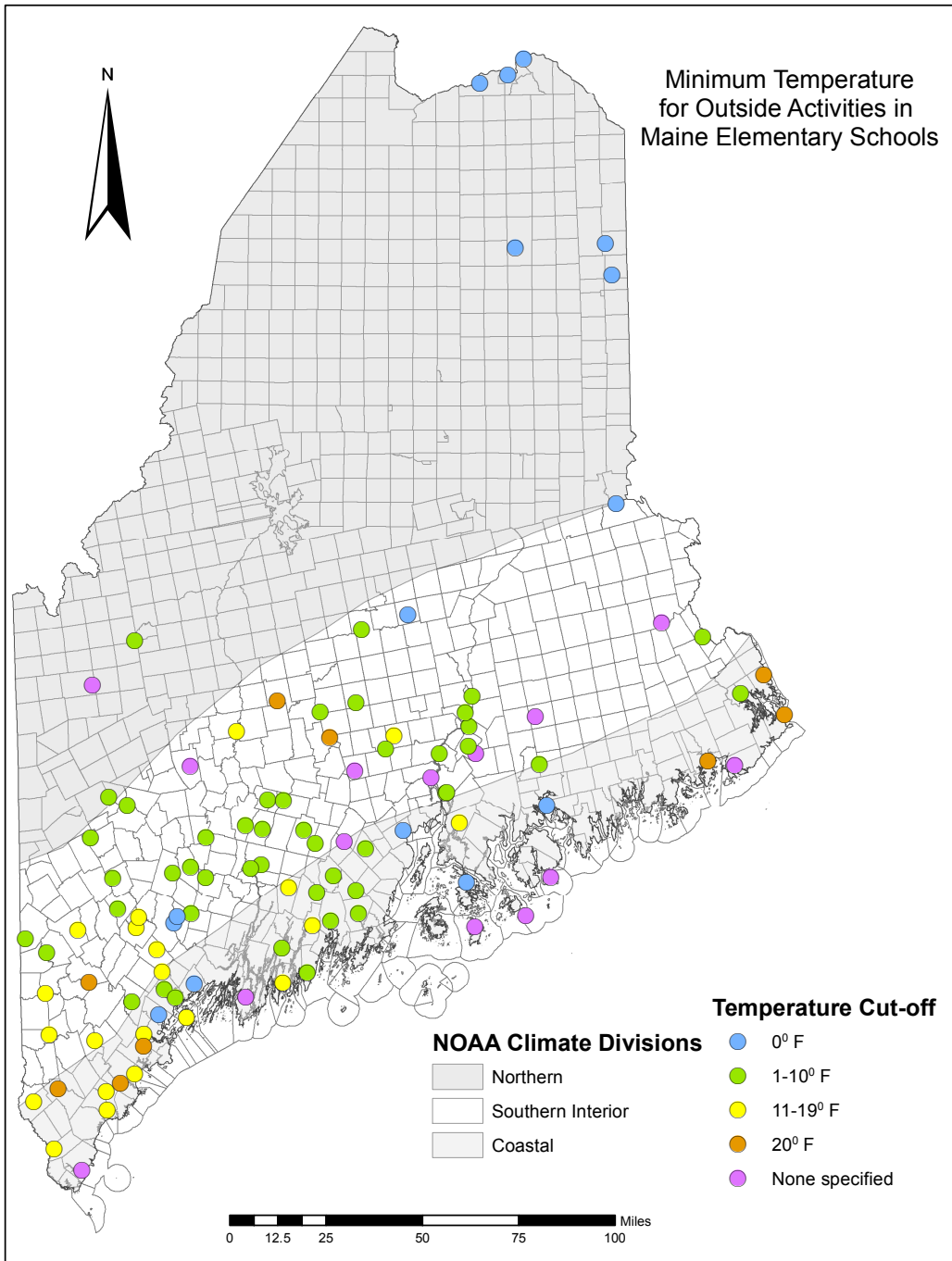


Figure 1. Temperature with wind chill policies for outdoor recess in Maine elementary schools with climate divisions indicated.^{28,32}

School Policies and Historical Weather Data

Participants in the survey were asked to estimate the average number of days per year that outdoor recess and/or PE were cancelled due to weather. There was a large range of estimates from 3 to 40 days. Many respondents wrote that they did not keep track of this number and could not give an accurate estimate. Almost all of those that did respond had very divergent answers from the estimates produced using historical weather data.

Ten years of historical weather data, including both air temperature and wind speed, were used to approximate the number of days outdoor recess would be cancelled in varying locations around the state according to five weather constraints. The data are first expressed (Fig. 2) as an approximate percentage of days in which outdoor recess would be cancelled between November and April. Unsurprisingly there is considerable geographic variation. A 0°F cut-off in Frenchville results in an almost identical percentage likelihood of cancellation as a 15°F cut-off in Sanford.

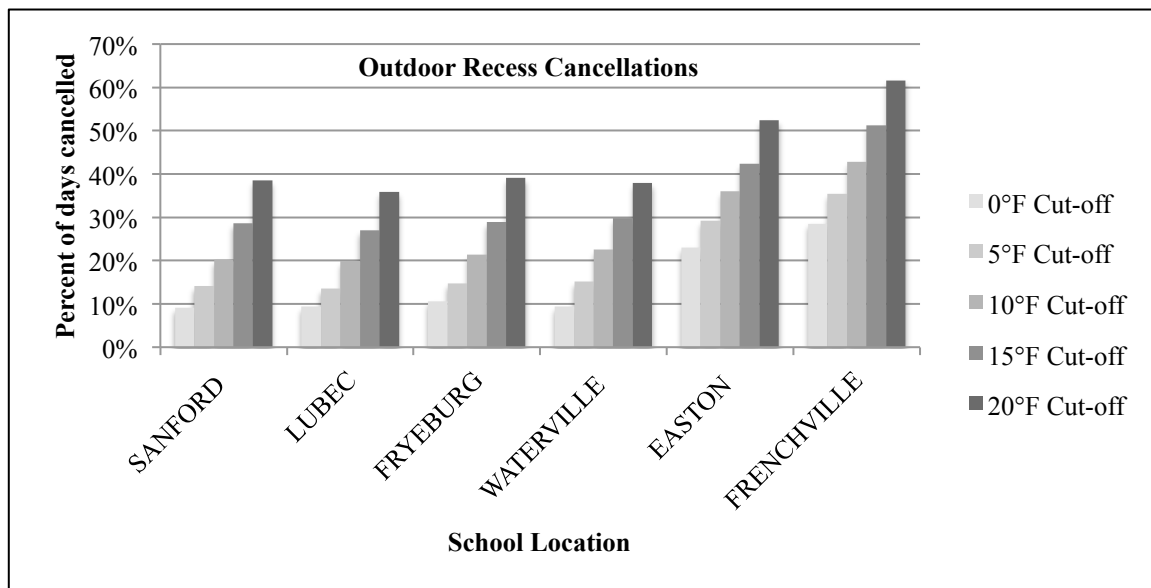


Figure 2. Percentage of days that outdoor recess would be cancelled in six analyzed locations between November and April.

In an effort to better represent the cancelled outdoor recesses in terms of actual school days instead of percentages, the researcher calculated the approximate number of cancelled outdoor recess days per week (Fig. 3) between November and April. As shown, the four schools located in the southern interior and coastal climate division have nearly identical trend lines.

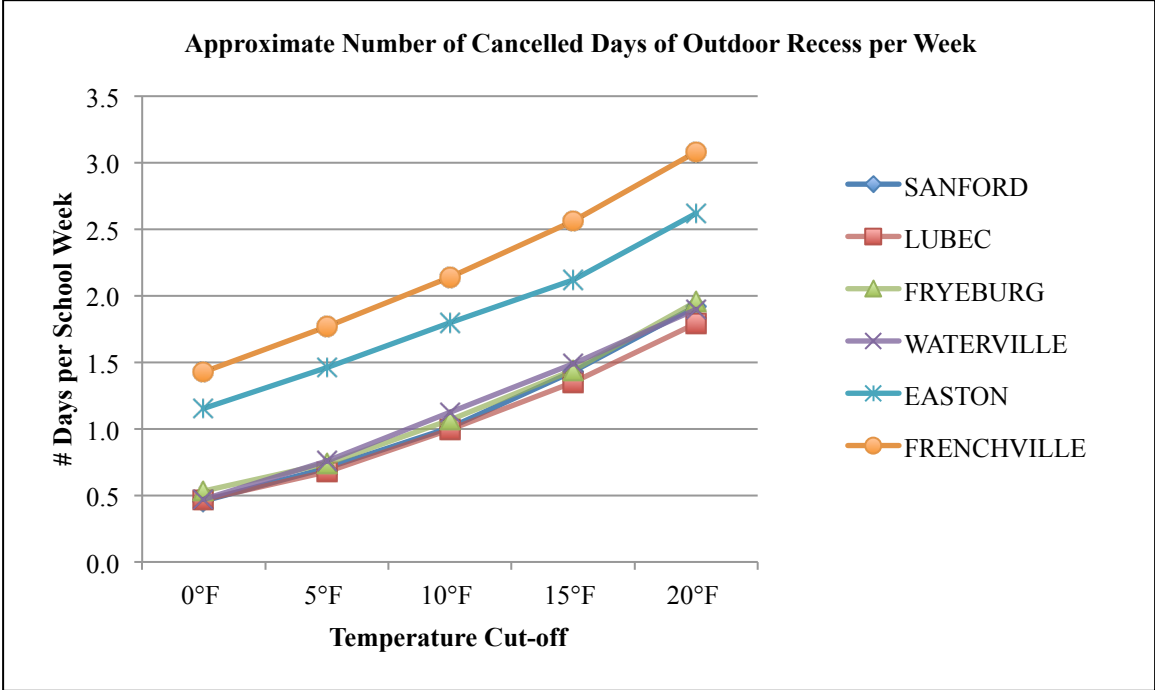


Figure 3. Estimated number of cancelled days of outdoor recess per 5-day school week between November and April.

Finally, in order to facilitate a comparison between these findings and survey responses, the approximate total number of cancelled outdoor recess days per winter season in all six locations was calculated (Table 3). The calculations were based on 22 weeks of school between November and April, which takes into consideration typically planned vacations during those months.

Table 3. Approximate number of cancelled outdoor recess days per winter season, assuming 22 weeks of school between November and April*.

	0°F Cut-off	5°F Cut-off	10°F Cut-off	15°F Cut-off	20°F Cut-off
SANFORD	10.1	15.6	22.2	31.5	42.3
LUBEC	10.3	14.9	21.8	29.7	39.5
FRYEYBURG	11.7	16.2	23.5	31.7	43.0
WATERVILLE	10.3	16.7	24.8	32.8	41.8
EASTON	25.3	32.1	39.5	46.7	57.7
FRENCHVILLE	31.4	38.9	47.1	56.4	67.8

* = Accounts for typically scheduled school vacations in these months.

Interview Results

The researcher interviewed three principals, two of whom had positions that were split between two schools. Pseudonyms are used here in describing the principals, their schools, and in referencing their interviews. Principal M was located at a small PK-6 school in Maine’s northern climate division. Principal B worked at two schools in central Maine located in the southern interior climate division that, combined, covered grades PK-4. Principal X was a principal of two PK-5 schools in the mid-coast area of Maine, one of which was located in the coastal climate division and one in the southern interior division.

The interviews highlighted the considerable variety of policy approaches that Maine elementary schools employ with reference to recess and PE, reflecting a finding of the survey results. Principal B explained that the two schools use a step-wise temperature cut-off policy to make outdoor recess determinations. The entire recess is held outside if the temperature with wind chill is 20°F or greater, recess is shortened to 10 minutes if the temperature with wind chill is between 15-20°F, and recess is held inside if it is below 15°F including wind chill. This policy was described as standing alone and served the purpose of providing clarity in making the indoor-outdoor recess decision centrally at the school office.

In contrast, Principal M described a recess policy that was just one aspect of an extensive district-level wellness policy. This wellness policy was comprehensive, addressing physical activity (including recess) but also guidelines about topics such as allowable fundraising activities (selling junk food was prohibited) and allowable rewards (rewarding with food was prohibited). The physical activity portion of the policy prescribed that recess would be held indoors if the temperature went below 0°F, including wind chill.

On the other hand, Principal X's schools did not have any formal policy at all related to weather and outdoor recess. As explained in the interview:

...I think it's really difficult to put a temperature rating on. [T]he first week of January is going to be a lot colder than March, I mean in terms of the sun. So it can be a nice sunny day in March and really, really cold, but that sun really does make a big difference. [P]utting something in the policy that is really definitive would be limiting.

Despite the varying approaches to policy, some consistent themes emerged from all three interviews: equipment, facilities, behavior, clothing, and staffing. For some schools these themes represented burdens, for others advantages.

Overlapping Themes: Behavior, Equipment, and Space

Facilities and behavior concerns were often closely related. Indoor recess in particular restricts space available for movement and behavioral issues sometimes arise.

[A]nytime we have indoor recess there are issues. There are kids that get hit, or something happens. So why not get them outside? It's better to get them wet than to have a kid that's getting hit. – Principal X

[T]hey can shoot the basketballs [inside]. Not necessarily a game. It's that fine line with giving them some movement but not giving them so much movement that things are out of control. Because it's really difficult for some kids in that time. – Principal B

Some participants spoke about similar space issues they faced even in regards to outdoor facilities. The challenges were created from having playground size restricted by rain (resulting in muddy fields) and/or snow piles in the winter. Snow and mud were brought up as current issues even though the interviews took place in May.

[T]here's still snow in the back of our school. With the rain, we just started this week starting going in the back [field]; we had been staying out front [in a paved area]. – Principal M

[W]e haven't actually been able to go on the field. And that just gets tricky, too, we want them to play but when kids are playing on the tar and balls are going up overhead, people get hurt.

– Principal B

The limited space available for movement was restricting the types of games and play students could take part in. Concerns about behavior arose when activities were restricted, whether those constraints occurred indoors or out.

All three principals discussed how access to specific equipment, not just adequate facilities, has a direct impact on outdoor recess and PE offerings. One school had a full inventory of cross-country skis and boots, collected over many years by the PE teacher. Two schools had full sets of snowshoes for use during PE in the winter. Indoor recess was also described by two participants as being influenced by access to equipment and technology, whether that recess was held in the gymnasium or in classrooms.

We're small enough that [during indoor recess] they can jump rope, they can hula-hoop, they can do Wii...

We try to get them up and moving, if we can. – Principal M

Different teachers have used...GoNoodleⁱⁱⁱ and...apps. We have one-to-one iPads, so [teachers] will use

GoNoodle and project that and the kids do a little dance. That kind of stuff. – Principal B

The use of technology to encourage physical activity during indoor recess is another example of a topic that was frequently cited in both survey responses and interviews.

ⁱⁱⁱ GoNoodle is an application that uses music and videos to encourage children to move.

The themes of behavior and clothing were also closely related. All interview participants explained that it is a common occurrence for students to fail to bring appropriate clothing for the weather; Principal B described it as “always an issue.” (The same outcome stemming from a different cause occurs when a student’s family did not have access to the necessary cold-weather gear. Schools often work to provide students with any gear they might not be able to bring from home.) Principal M explained that her students almost always own the appropriate cold-weather clothing, but sometimes choose not to bring it to school:

I have kids crying saying, “I don’t want to go outside today.” It’s not a choice; you have to go out today. You have to go out. And I’ve learned, when I go to Goodwill shops, I’ll pick up ski pants because they’ll play that, “Oh, I forgot my ski pants.” Hey! I’ve got a pair for you today! [N]o excuses...[but] most kids want to go outside.

Clothing concerns, and the potential for subsequent calls from parents when children end up wet or cold, were an issue all three principals said they contend with. This was often cited as the main reason for not bringing children outside in the rain or mud.

Staffing: Challenges, Advantages, and Solutions

Supervision by adults during outdoor recess was described as primarily the job of teachers, though educational technicians and/or administrators also sometimes filled the role. Administrators in some schools felt that finding staff for outdoor recess supervision was a burden, while others found it easy. For outdoor physical education classes, the PE teacher was the primary supervisor and decision maker.

At the schools closer to the coast, Principal X explained that, “What I found was that the kids really do like to go outside, no matter how bad the weather is. It’s the teachers that don’t want to go outside.” However, Principal M described teachers at this northern school in the

following way, “They don’t mind. I have a good group of teachers, I really do... I don’t have a lot of teachers that complain about going out. No, I don’t think I have one.” Finally, Principal B sought to avoid potential conflicts by encouraging teams of teachers to come up with their own solutions for who would take recess duty and who would fill other duty roles, saying, “I let them work it out amongst themselves.”

Principal X saw the attitude among some teachers as being a hindrance to getting students outside more frequently. Though the ideal was described as “just hiring all teachers who are of that mindset [that outdoor time is important for kids],” it remained a challenge. On the other hand, Principal B’s solution appeared to mitigate this issue. And for Principal M it was not perceived as an issue at all. The contrasting attitudes of staff members at different schools was present independent of the attitude of the building administrator, as all three principals indicated placing a high value on recess and physical activity.

Perceived Value of Recess and Outdoor Physical Activity

As mentioned previously, the wellness policy in place at the northern Maine school was comprehensive and it covered the whole district. For Principal M, this policy was representative of the great value the district and school placed on wellness. The policy was supported at multiple levels, from the school board to the superintendent to the parents, and it was often used as a motivational tool. For example, students could earn slips for good behavior and every time the school reached 1,000 slips the students would be rewarded with a full day of wellness activities. The principal described with obvious pride the way students valued their wellness days: “They vote for their snack. And you know what the most popular snack is for wellness days? A yogurt bar with all kinds of fruits.” When parents expressed consternation at one or

more aspect of the wellness policy (for example, being asked not to bring cupcakes for birthdays), the principal explained, “I’ll listen to parents, but I’ll say, ‘It’s policy now. It’s been adopted, we have to live by the policy.’ And they usually come around.” The policy was not only a means for articulating values but for creating a community that rallies around those shared values. An illustrative example provided during the interview was when, “...a dad brought into kindergarten last year a watermelon carved out as a shark. Yes! Filled with all kinds of fruits. And it was really cute.” These creative solutions to following policy in a fun way were held up as examples and praised publicly.

The value placed on recess was, for Principal B, also expressed at the institutional level; “I would say overwhelmingly here people believe kids should have recess, and... it’s not something to be taken away [for punishment]... I think that’s a pretty general belief here.” Unlike the school in northern Maine, however, these values were not articulated into a broader policy. Similarly, Principal X described the value of outdoor activities but they were not then supported by policy. In this case, the values were explained in much more personal, as opposed to institutional, terms:

...I always like being outside myself. So those things we value we like to convince everybody else that it’s worthwhile... A lot of the learning that took place when I was teaching was outside... I looked at it as some of the strongest learning that took place, but through biased eyes I saw it that way.

Temperature, wind, and precipitation, are the basic variables at play in this question of when students stay inside for recess and PE. Explicating a temperature or wind chill cut-off is the easy part of this complex equation. The interviews exposed the more hidden and nuanced aspects of this seemingly simple question including issues of culture, expectations, and values. As noted, some interview themes reflected data collected in survey responses. Others, such as the impact of behavior and facilities on outdoor recess time, were not apparent in survey responses.

CHAPTER 4

DISCUSSION

The goal of this study was to fill a gap in available research about time spent outdoors during physical education classes and recess. This research delved into a very specific topic within this more general theme, one that has not been studied before as far as the researcher is aware.

Limitations

The primary limitation of the current study is the potential self-selection bias of those that opted to respond to the survey. It is possible that those principals who already value or are concerned with student outdoor time were more motivated to respond. Although one example refuting this hypothesis is a respondent that reported their school does not offer outdoor recess at all during winter months. The interview recruitment process also compounded the possible selection bias. Interview participants were only chosen from those that indicated in their survey responses an agreement to be contacted for follow-up, and a number of potential interviewees declined to participate or did not respond to recruitment emails.

The interview portion of this research was limited in scope, and participants did not include any principals from schools that had an FRPL rate one or more standard deviations below the state average. That is, a school with higher-than-average socioeconomic status was not included. In addition, interview subjects did not represent schools located in one of the two most southerly coastal counties. It is possible that interviews from these demographics would have uncovered different themes. Finally, in this study the methodology for finding meaning and

themes from the interview data did not include a mechanism for triangulation. Though the methodology employed here served the purpose of producing work of an exploratory nature, a more thorough approach would have included triangulation back to interview participants or a third party.

One limitation of the statistical analysis of geography, FRPL, and temperature cut-off was the relatively small number of subjects in each category. It is possible that the small subject size in some categories artificially inflated the statistical significance found in the analysis. Though there was a slight difference found in mean FRPL rates among survey respondents and the Maine state average (52% and 48%, respectively), it was not likely to impact the findings. The difference is probably due to the inclusion of high schools in the overall state data, which typically have a lower reported FRPL than elementary schools.

The use of NOAA's climate divisions themselves present another potential limitation to this study. The benefit of using these divisions is that they are local enough to take into account definite intra-divisional differences in precipitation, and average, minimum, and maximum temperatures, but they are large enough to enable grouping the data into sets (i.e. they do not represent one lone weather station). There are other ways of geographically categorizing weather and climate (e.g., USDA plant hardiness zones), and it is possible that methodology using a different categorization system would produce different results. Ideally, further study could test the validity and reliability of using climate divisions in this kind of research.

The methodology used for categorizing the temperature cut-off categories, and thus involving the statistical analyses, required some subjective decision making. The researcher's goal was to capture the pattern evident in the policies described while allowing for the inclusion of "outliers." For example, by far the most common cut-off temperature in the 11-19°F category

was 15°F, but the category was broadened to include the few outliers such as 16°F or 13°F. The two categories representing the high and low end cut-offs (20°F and 0°F, respectively) were set at one sole temperature because there were no examples above or below those, and they were commonly applied policies.

Finally, the additional survey questions that were included in this study but that were not part of the original S-PAPA questionnaire have not yet been validated. The results of the survey provided an excellent starting point for research on this topic, but further study would benefit from validity and reliability testing of these questions.

Further Study

Despite the fact that research participants stated nearly universally that rain was an automatic reason to cancel outdoor recess and PE classes, this research did not include a rainy-day analysis of actual weather data. This exclusion was made for two reasons. First, precipitation data from some weather stations are incomplete and not reported as uniformly as temperature and wind speed. Second, the way precipitation data is reported makes it challenging to differentiate between heavy and light rain, an important distinction in this context because many schools reported going outside in light rain or mist but not in heavy rain. These constraints made it much more difficult to estimate cancellations caused by precipitation. However, future research could explore further the available precipitation data in an attempt to find the approximate number of days outdoor recess might be cancelled due to rain in varying locations around the state. It would also be interesting to note if these numbers are expected to rise or fall over time with effects from climate change.

Future research on this subject could track actual cancelled outdoor recess days at different schools employing varying policies. This would give real on-the-ground data of policy impacts on outdoor time without needing to rely on historical weather averages. Further research would also benefit from additional in-depth interviews representing more diverse school demographics. As mentioned previously, this could result in more thorough findings.

As climate change continues to affect Maine it is possible that current school weather policies and practices may need review and reconsideration. There is certainly the potential for heat to be an increased factor in deciding outdoor activity policies for Maine students. Only one survey respondent mentioned heat as a current contributing factor to decision making, but it would be reasonable to expect that this issue will become more prevalent in any future research. As point of fact, in the month that this research was coming to an end (June 2017), the Augusta, Maine school district opted to send elementary students home early one day because of heat. This was the first time the superintendent of that district could recall that happening.³³

Another issue related to climate change is the potential for ticks to impact outdoor policies and practices in school settings. The current research did not explore this issue, however one interview participant raised the topic:

“Recently [ticks have] been more of a concern. My wife started bringing it up, ‘How can you have [students] go work on the trails?’ ... it’s interesting that my own wife is questioning what I’m doing because of the ticks. She wouldn’t question it because of the weather, but she would because of the ticks.” -
Principal X

The survey was completed during the winter months, so it is not very surprising that the presence of ticks and risk of tick borne diseases was not mentioned by respondents. Interviews, however, were conducted in the spring when tick concerns are greater. If more interviews had been conducted in locations with large tick populations it may have been more prominent in the

research findings. The impact of ticks on outdoor recess and physical education would be a fascinating area of further research.

Implications

The planned purpose of the weather data analysis was to simply supplement survey responses. It was not expected to provide considerable new insight into the research questions. However, this did not prove to be the case. The differences between the survey responses and weather data estimates of cancelled outdoor recess days per year were considerable and shed light on the real-life implications of varying policies.

It is important to note again that some survey participants stated they did not know how many days of outdoor recess were cancelled at their school and felt unable to offer a reasonable approximation. But those that did respond had, in general, very different estimates from what the actual weather results suggested. More than 40 respondents stated an estimate of 10 or fewer cancelled outdoor recess days per year, however even a conservative weather analysis showed none of the six schools would have that few annual outdoor recess cancellations. This difference is particularly striking because the weather data estimates are only based on temperature and wind chill and do not take rain (a nearly universal predictor of indoor recess) into account. Additionally, weather data were taken from noon-time readings which would probably be slightly later in the day (and thus typically warmer) than when actual decision making about recess takes place.

The discrepancy here shows that these survey respondents were either underestimating or demonstrating that they do not always follow their own policies. The investigator believes it is

most likely the former. Without tracking in place administrators simply do not have a good sense of the actual number of cancelled outdoor recess days.

While the inconsistency was surprising, the take-away is incredibly important. This weather data analysis could help administrators and schools rethink their current policies and adjust accordingly to create more outdoor activity opportunities for their students. Schools in Sanford and Lubec reported in their survey responses a minimum temperature and wind chill cut-off of 20°F. Both schools would reduce their number of cancelled outdoor recess days by almost half if their minimum was dropped to 10°F. One Waterville school reported their minimum as 10°F but their average number of cancelled outdoor recess days would drop from nearly 25 to 10 if they decreased their minimum to 0°F. All responding schools from northern Maine reported their minimum cut-off as 0°F, which is important because that still results in an average of 25 or more cancelled outdoor recess days per year.

Conclusions

These research findings show that there is some lack of awareness of how temperature and wind chill policies actually affect the time Maine elementary students have outdoors during a school year. This goes in two directions: administrators may not realize how many outdoor days students are actually missing, and they may not realize how even slight changes to policy could change that number. It is the researcher's hope that this may help bring increased attention to the issue and prompt Maine school administrators to review their current policies and practices related to outdoor recess and PE classes. In a more general sense, this research may help remind educators about the importance of daily opportunities for physical activity during the school day.

Perhaps it will encourage the use of technology or other tools to incorporate physical activity during the sometimes inevitable indoor recesses.

Finally, these research findings demonstrate that cultural norms and values play a huge role in shaping school-based outdoor activity policies and practices. It takes much more than an enthusiastic, outdoor-minded principal to create and implement policies that support increased outdoor time for students. All levels of administrators, teachers, parents/guardians, the wider community, and students themselves play a role. If limited access to facilities hinders providing additional outdoor opportunities, it will take many stakeholders (administrators, community organizations, taxpayers) working together to recognize the issue and affect change. If equipment is needed to increase activity options for outdoor PE classes, acquiring it might necessitate fundraising efforts, parent/community support, grant writing, and spearheading efforts from PE teachers.

When outdoor time for children is valued in a school setting, the students' day-to-day realities will reflect that. This can mean students experience significantly fewer indoor recess days and participate in more outdoor sport opportunities during physical education classes. As previous research has shown, more outdoor physical activity time is good for the health, wellness, and academic success of Maine children.^{2,3}

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APPENDIX
SURVEY INSTRUMENT

Recess and Physical Education Policies in Maine Schools

Q1 This survey is part of a research project being conducted by Lauren Jacobs, a graduate student in the Department of Kinesiology and Physical Education at the University of Maine. This research is investigating how weather policies and practices decide when students participate in outdoor recess and/or physical education classes in Maine schools. Completing the survey should take no more than 10 minutes. Your responses will not be anonymous, as your school information will be attached to your responses. However, responses will be kept confidential and will only be seen by the researcher and faculty advisors. Participation in this survey is entirely voluntary. If you choose to participate, you may stop at any time or skip any questions you do not wish to answer. Submission of your survey responses implies consent to participate. If you have any questions about this research, please contact Lauren Jacobs or Dr. Robert Lehnhard. Please indicate below that you have read and understood this information and that you agree to participate. A copy of this informed consent can be provided to you via email or mail upon request; please contact Lauren Jacobs for a copy.

Yes, I agree to participate (1)

No, I do not agree to participate (2)

Condition: No, I do not agree to parti... Is Selected. Skip To: End of Survey.

Q2 Your Title

Principal (1)

Asst. Principal (2)

Other (3) _____

Q3 Would you be willing to be contacted for more in depth follow-up questions?

Yes (1)

No (2)

Q4 Would you like to be sent a brief report outlining the findings of this research?

Yes, via email (1)

Yes, via USPS (2)

No, thank you (3)

Q5 School Name

Q6 District Name

Q7 Grades Served by School. Please check all that apply.

PK and/or Head Start (1)

Kindergarten (2)

1st (3)

2nd (4)

3rd (5)

4th (6)

5th (7)

6th (8)

7th (9)

8th (10)

Q8 How many students are enrolled in this school?

Q9 What percentage of students are eligible for Free and Reduced Price Lunch (FRPL)? Using fiscal year 2016 data is acceptable.

Q10 Recess Questions: Does your school provide all students with scheduled recess daily?

Yes (1)

No (2)

Don't Know (3)

Other (Please explain) (4) _____

Q11 During favorable weather conditions, are students allowed to stay indoors during recess?

Yes (1)

No (2)

Don't Know (3)

Other (Please Explain) (4) _____

Q12 During inclement weather, can students be physically active during recess?

Yes (1)

No (2)

Don't Know (3)

Display This Question:

If During inclement weather, can students be physically active during recess? Yes Is Selected

Q13 If yes, how are students able to be physically active indoor during recess? (i.e. they have access to the gym, a multi-purpose room, etc)

Q14 Does your school district have a written policy specifying under what conditions outdoor recess is to be cancelled?

Yes (1)

No (2)

Don't Know (3)

Display This Question:

If Does your school district have a written policy specifying under what conditions outdoor recess is to be cancelled? Yes Is Selected

Q15 Briefly explain the district policy specifying under what conditions outdoor recess is cancelled. Please be as specific as possible with temperatures, wind chill, precipitation, etc.

Q16 Does your individual school have a written policy specifying under what conditions outdoor recess is to be cancelled?

Yes (1)

No (2)

Don't Know (3)

Display This Question:

If Does your school have a written policy specifying under what conditions outdoor recess is to be cancelled? Yes Is Selected

Q17 Briefly explain the school policy specifying under what conditions outdoor recess is cancelled. Please be as specific as possible with temperatures, wind chill, precipitation, etc.

Display This Question:

If Does your school have a written policy specifying under what conditions outdoor recess is to be cancelled? Yes Is Selected

Q18 According to your school policy, who is responsible for making the decision to cancel recess? (Choose all that apply.)

Secretary (1)

Principal (2)

Duty Teacher (3)

Other (Please Explain) (4) _____

Display This Question:

If Does your school have a written policy specifying under what conditions outdoor recess is to be... No Is Selected

Q19 In practice, who is responsible for making the decision to cancel recess? (Choose all that apply.)

Secretary (1)
Principal (2)
Duty Teacher (3)
Other (Please Explain) (4) _____

Display This Question:

If Does your school have a written policy specifying under what conditions outdoor recess is to be cancelled? No Is Selected

Q20 Without a written school policy in place, please explain what, if any, in-practice or unofficial policies are used to decide when outdoor recess is cancelled. Please be as specific as possible with temperatures, wind chill, precipitation, etc.

Q21 What time of day is the decision made to cancel outdoor recess?

Q22 In a typical school year, approximately how many days of outdoor recess are cancelled due to inclement weather?

Q23 This final set of questions refers to the Physical Education (PE) program at your school. This section of the survey may be completed by a PE teacher or by whomever completed the previous questions. Who is completing this section of the survey?

Same respondent as above (1)

PE Teacher (2)

Display This Question:

If Who is completing this section of the survey? PE Teacher Is Selected

Q24 How many years have you been teaching at this school?

Q25 How many total minutes per week of physical education do students receive? (Provide the average.)

Q26 How many days per school year are physical education classes cancelled (e.g. for inclement weather, gym not available, assemblies, etc.)? (Provide the average.)

Q27 In a typical year, approximately how many days of physical education classes are held outdoors?

Q28 Who is responsible for deciding if outdoor PE classes must be cancelled due to weather? (Choose all that apply.)

Secretary (1)

Principal (2)

PE Teacher (3)

Other (Please Explain) (4) _____

Q29 Does your school have a written policy specifying under what conditions physical education classes may not be held outdoors?

Yes (1)

No (2)

Don't Know (3)

Display This Question:

If Does your school have a written policy specifying under what conditions physical education classes may not be held outdoors? No Is Selected

Q30 Without a written school policy in place, please explain what, if any, in-practice or unofficial policies are used to decide when PE classes may be held outdoors. Please be as specific as possible with temperatures, wind chill, precipitation, etc.

Display This Question:

If Does your school have a written policy specifying under what conditions physical education classes may not be held outdoors? Yes Is Selected

Q31 Please briefly explain the school policy specifying under what conditions PE classes may not be held outdoors. Please be as specific as possible with temperatures, wind chill, precipitation, etc.

BIOGRAPHY OF THE AUTHOR

Lauren Elizabeth Jacobs was born in Augusta and raised in Winthrop, Maine. She attended high school at Gould Academy in Bethel and graduated in 2003. She earned a Bachelor of Arts in English degree from Bates College in Lewiston in 2007. After a number of years working in the field of outdoor education she returned to school, enrolling in the Kinesiology and Physical Education graduate program at the University of Maine. After completing her degree, Lauren will begin teaching in the School of Kinesiology, Physical Education, and Athletic Training at the University of Maine as a lecturer. Lauren is a candidate for the Master of Science degree in Kinesiology and Physical Education from the University of Maine in August 2017.