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PHYSICAL ACTIVITY

Relationship Between Physical Activity and Stress Among Junior High School Students in the Physical Education Environment

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Abstract

The purpose of this study was to explore grade-level differences (7th, 8th, and 9th) among junior high school students' perceptions of the effects of participation in physical education (PE) class on individual environmental stress. The role of physical activity as a stress reduction tool has been well documented. However, physical activity as a stressful event in the school and PE environment has been less established, particularly in junior high school students. Study participants comprised 872 junior high school students, 585 males (67%) and 287 females (33%), enrolled in four junior high schools. Stratified by grade, 315 seventh-grade (228 males, 87 females; M = 1.28, SD = .448), 281 eighth-grade (204 males, 77 females; M = 1.27, SD = .447), and 276 ninth-grade (153 males, 123 females; M = 1.45, SD = .498) students responded. By grade level, significant differences ($p < .05$) were reported for five of the 12 scaling questions. In general, seventh graders were more likely to respond they could better handle stress after participating in PE class, to look forward to coming to their PE class, to report lower stress levels before arrival to PE class, and to report lower stress levels after participation in PE class than were eighth and ninth graders. Altogether, follow-up qualitative findings

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reported three major themes regarding the PE environment and stress. PE acted as a stress mitigation mechanism and an opportunity for social bonding. Qualitative findings also referenced classmates as a negative stress mechanism in the PE environment.

Every person, at some point in time and at varying degrees, experiences stress. According to Grant et al. (2003), stress has been defined as "…environmental events or chronic conditions that objectively threaten the physical and/or psychological health and well-being of individuals of a particular age in a particular society" (p. 462). Because stress is an inevitable part of life, an individual needs to be equipped with healthy mechanisms to combat stressors. Physical activity is one positive stress management method for individuals to address life stressors (Aherne, 2001; Barney, Benham, & Haslem, 2014; Haugland, Wold, & Torsheim, 2003).

Literature specific to the relationship between physical activity and stress has indicated that physical activity is a likely mediator between stress and health (or illness; Gill, 1994). Physical activity has been associated with a reduced psychological stress response (Rejeski, Thompson, Brubaker, & Miller, 1992) and decreased physiological responsiveness to physical and psychosocial stressors (Blumenthal et al., 1989; Dishman, 1994; Peronnet & Szabo, 1993; Rimmele, 2007), resulting in psychological and physiological benefits enabling individuals to cope with stress more effectively (Fleshner, 2005; Taylor, 2000). Conversely, less active or nonactive individuals tend to experience more susceptibility to the adverse influences of life stress (Crews & Landers, 1987), increased illness when experiencing negative life events (Brown, 1991), and slower recovery from stressful events (Crews & Landers, 1987).

Stress Response to Physical Activity in the Physical Education Environment

Physical activity levels, through participation in sports or structured physical activities, and stress levels were investigated in a sample of Norwegian adolescents. Results indicated that changes from low physical activity levels to moderate or high physical activity levels were associated with lower levels of reported stress (Moljord, Moksnes, Ericksen, & Espnes, 2011). Haugland et al. (2003) surveyed adolescents and compared their perceived school-related stress and

leisure-time physical activity outside of school. Participants who reported school-related stress were less likely to report health complaints if they participated in leisure physical activities every week.

Research has also investigated physical activity on stress in college-aged students. Barney et al. (2014) investigated 350 college students' perceptions regarding the effects of participation in physical activity courses on life stressors. Study findings suggested that a college student's participation in physical activity classes helped to mediate life stressors. Specifically, college students felt that participation in physical activity courses helped them to accomplish other academic assignments. As well, this sample perceived that participation in physical activity helped them to better handle other life stressors (Barney et al., 2014).

In adolescence, physical activity can be used as the vehicle to better control personal stress. For many adolescents, common life stressors include bullying (O'Neill, 2017), family dynamics (Aherne, 2001), peer influences (Allan & Lawless, 2003), perceived expectations of self and from others (Deutsch & Schmertz, 2011), and difficulty in time management (Gonzalez, Hooper, Lee, & Lin, 2010). Yet, within the school context, physical education (PE) classes provide students with opportunities to be physically active, possibly helping to mitigate daily stress. Lang et al. (2016) developed a PE stress coping program for German-speaking vocational students in Switzerland titled Effects of a Physical Education Coping Training (EPHECT). The primary purpose of EPHECT was to foster resilience through the development of an individual and adequate coping repertoire. PE teachers in the EPHECT program completed eight modules specific to module implementation into their regular PE lessons. Students were instructed to perform motor learning tasks followed by a short reflection moderated by the PE teacher. Findings suggest implementation of the EPHECT program in PE classes can make positive contributions to help vocational students develop adaptive coping (Puhse & Gerber, 2005).

Physical Activity as a Stressful Event in the Physical Education Environment

The role of physical activity as a stress reduction mechanism has been well documented. However, physical activity as a stressful event in the school and PE environment has been less established.

Little research has addressed PE in the school environment as producing student stress, nor ways to decrease its stressful effects (Back, 2015; Blankenship, 2013; Currie & Sumich, 2014; Gerber, 2009; Ho, Chiang, & Lin, 2016; Ishii & Osaka, 2010; Lang et al., 2016; Lee, Kang, & Kim, 2017; Marraffa, 2015). Table 1 presents systematic review findings of studies addressing student exposure to stress in the PE environment across primary and secondary grade levels.

Across all grade levels, Currie and Sumich (2014) outlined several strategies for reducing stress and anxiety in PE, in general. They suggest positive class climate, promoting humanistic values, tolerance, individual expression, student choice, and self-evaluation for reducing PE stress. A number of studies that addressed stress and PE were identified (Back, 2015; Lee et al., 2017). Back (2015) reported a negative correlation between academic stress and school PE in high school students, with a partial mediating effect between the relationship of attitudes toward PE and psychological well-being. Lee et al. (2017) reported a correlation between high stress and athlete satisfaction and burnout.

Other studies that addressed stress in PE class and junior high school students (sixth to ninth grades) were identified (Blankenship, 2013; Gerber, 2009; Ho et al., 2016; Ishii & Osaka, 2010; Marraffa, 2015). Ho et al. (2016) identified stress related to athletic training and competition in junior high PE, and Ishii and Osaka (2010) identified exercise in and of itself as a stress-inducing agent. Additionally, Ishii and Osaka reported that junior high school students who disliked PE and sport did not benefit from the stress-reducing potential of PE. Gerber (2009), similar to Ishii and Osaka, identified that stressful junior high school PE experiences negatively affected positive attitudes toward physical activity and PE. Junior high school PE experiences leading to increased class stress included issues with a teacher or classmates, psychological and physical violence, pain or discomfort, poor classroom organization and class structure, and low perceived ability or consistent feelings of failure (Gerber, 2009).

Blankenship (2013), similar to Currie and Sumich (2014), addressed several methods of reducing stress during junior high PE, including creating developmentally appropriate tasks, private practice sessions, the use of stations, practice sessions, creating a motivational climate, and changing student perceptions of demands and abilities.

Table 1
Student Exposure to Stress in the Physical Education Environment Across Primary and Secondary Grade Levels

Title	Citation	Study country	Study design	Grade level/age	Sample size	Assessment method	Outcomes
Changes in Satisfaction With Physical Education and Intrinsic Sport Motivation as a Function of Chronic Stress Experiences in Physical Education Classes	Gerber, 2009	Switzerland	Cross-sectional	Junior high (6th to 9th grade)	302 boys and girls	Survey	Stress negatively affected intrinsic motivation and contributed to reduced PE satisfaction levels. Stressful experiences in PE affected positive attitudes toward physical activity and PE: • problems with teacher or classmates • psychological and physical violence • pain during or after PE • poor organization and class structure • low perceived ability or consistent feelings of failure
Physical Education and the Degree of Stress	Ishii & Osaka, 2010	Japan	Cross-sectional	Junior high	268 (129 boys, 139 girls)	Survey	Students who disliked physical education and sports did not benefit from stress-reducing potential of exercise and sport. Exercise may be a stress-inducing agent.
The Stress Process in Physical Education	Blankenship, 2013	USA	Review	7th grade	N/A	N/A	Reducing stress during PE: • Create developmentally appropriate tasks • Arrange private practice sessions • Use stations • Maximize practice • Create a task-involved motivational climate • Identify students with low perceived competence/high trait anxiety • Change student perceptions of demands and abilities • Teach relaxation techniques

Table 1 (cont.)

Title	Citation	Study country	Study design	Grade level/age	Sample size	Assessment method	Outcomes
Creating Stress-Free Learning Environments for Sport and Physical Education	Currie & Sumich, 2014	Australia	Review	All grades/ not identified	N/A	N/A	Reducing anxiety in PE: • Ensure positive class climate with zero tolerance for bullying • Promote humanistic values • Build tolerance • Encourage free, creative, individual expression • Establish 80% success rate to build confidence • Allow student choice or offer activities rated high enjoyment • Permit students to self-evaluate and measure results
What Is the Effect of Yoga Compared to a Physical Education Class on Stress Reactivity for Sixth-Grade Students?	Marraffa, 2015	USA	Review	6th grade	30 (17 boys, 13 girls)	N/A	Yoga did not provide significant differences in stress reactivity. Yoga may be beneficial in coping with stress.
The Mediating Effects of Hope Between Attitude Toward School Physical Education, Academic Stress, Ego-Resilience, and Psychological Wellbeing of High School Students	Back, 2015	Korea	Cross-sectional	High school (ages 14 to 18 years)	780[a]	Survey	Positive correlation toward school PE: attitude toward school physical education, academic stress, ego-resilience, and psychological well-being. Negative correlation toward school PE: academic stress. A partial mediating effect between youth attitude toward school PE and academic stress, ego-resilience, and psychological well-being.

Table 1 (cont.)

Title	Citation	Study country	Study design	Grade level/age	Sample size	Assessment method	Outcomes
Stress Management in Physical Education Class: An Experiential Approach to Improve Coping Skills and Reduce Stress Perceptions in Adolescents	Lang, Feldmeth, Brand, Holsboer-Trachsler, Puhse, & Gerber, 2016	Switzerland	Review	Vocational	131[a]	Survey	Examined intervention effects between pre- and postintervention, and postintervention and 6-months follow-up: • Referencing the control group, the intervention group showed improved coping skills from pre- to postintervention. • Postintervention to follow-up, stress decreased for the intervention group. • Indirect effect on stress perception at follow-up via improved adaptive coping skills. • Support "Effects of a Physical Education-based Coping Training" (EPHECT) as a positive contribution to the development of adaptive coping skills.
A Study on Relationship Between Stress and Coping Strategies of Junior High School Students in the Physical Education Programs	Ho, Chiang, & Lin, 2016	Taiwan	Cross-sectional	Junior high	589 boys and girls	Survey	Junior high student stress in PE related to PE athletic training and competition. Significant differences in gender, grade, competition level, sports, and experience in physical education programs. Positive correlation between stress identification and application of coping strategy.

Table 1 (cont.)

Title	Citation	Study country	Study design	Grade level/age	Sample size	Assessment method	Outcomes
Relationships Among Stress, Burnout, Athletic Identity, and Athlete Satisfaction in Students at Korea's Physical Education High Schools: Validating Differences Between Pathways According to Ego Resilience	Lee, Kang, & Kim, 2017	Korea	Cross-sectional	High school	332 (225 boys, 107 girls)	survey	High stress correlated with burnout, and high levels of burnout negatively related to athletic identity and athlete satisfaction.

Note. N/A = Not Applicable.

[a]Gender not identified.

Method

This study used the salutogenic approach conceptual framework (Quennerstedt, 2008). The salutogenic conceptual framework is not about what health is, but pays attention to resources in the creation, preservation, and development of health. Quennerstedt (2008) stated,

> Physical activity and movement can be regarded as something more than mere protection against disease or overweight, and by posing salutogenic questions we can enrich our understanding of the relation between physical activity and health, and in consequence richness to the perspective of health in physical education. (p. 277)

For this study, the resource was the PE class. It is implied that PE class can help students maintain and control their stress. The purpose of this study was to investigate the extent of grade-level differences (seventh, eighth, and ninth) among junior high school students' perceptions of the effects of participation in PE class on individual environmental stress.

Participants

For this study, 872 junior high school students (585 males, 287 females) from four intact junior high schools, three from Utah and one from California, were sampled. Student ages ranged 11 to 15 years. Grade levels for all four junior high schools encompassed of seventh, eighth, and ninth grades. Stratified by grade level, 315 seventh-grade (228 males, 87 females), 281 eighth-grade (204 males, 77 females), and 276 ninth-grade (153 males, 123 females) students responded to the survey instrument.

Instrumentation

Through a literature review, the investigators did not identify an instrument specific to PE class and stress related to junior high school students. For this study, a 12-question survey instrument was developed. The survey consisted of six questions with response options of yes, no, and sometimes (two of these questions contained qualitative follow-up), three questions with Likert scale response options (1 = *low*, 2 = *medium*, 3 = *high*, and 4 = *very high*; one of these

questions contained qualitative follow-up), and three demographic questions. For face validity, junior high–aged students reviewed survey questions for clarity and understanding. Face validity is commonly viewed as the degree to which representative respondents or users judge that the scaled items of an assessment instrument are appropriate to the targeted assessment objectives (Nevo, 1985). Participants answered questions regarding PE and stress indices (Questions 3 to 8), self-reported stress levels before and after PE class (Questions 9 and 10), and self-perception of participation in PE for daily stress management (Question 11).

Procedures

Convenience sampling was employed for data collection in this study. Before study implementation, investigators contacted the junior high physical educators to explain the study and survey. After securing agreement from the physical educators, the researchers had them administer the surveys to their student. Before survey administration, the physical educators explained the study to their students. Prior to data collection, the physical educators were instructed on survey administration. Completion of survey, explanation, and administration took approximately 15 min.

Prior to survey distribution and data collection, the university institutional review board (IRB) reviewed study protocol and granted approval for the study to be conducted. All participants were subsequently assured that their voluntary decision to participate or not participate in the study would not affect their grade in class or class standing. A 98% survey response rate was recorded.

The school's classes ran on a block schedule, A-day/B-day with class lasting approximately 80 min, from bell to bell. Quantitative and qualitative data were analyzed regarding junior high school students' experiences with PE class and individual stress. Only observed data were used for quantitative and qualitative analyses.

Quantitative Research Design

The study had a quasi-experimental, mixed-methods design. Data were collected from a survey of 872 participants (junior high school students), 585 males (67%) and 287 females (33%), enrolled in four junior high schools. Stratified by grade level, 315 seventh-grade (228 males, 87 females), 281 eighth-grade (204 males, 77 females),

and 276 ninth-grade (153 males, 123 females) students responded to the survey instrument.

The following survey questions were considered for analyses:

1. When I come to this physical education class, I forget about what is stressing me out. (Question 3)
2. After participating in the class activities, I feel I can handle what is stressing me out. (Question 5)
3. I look forward to coming to my physical education class. (Question 6)
4. Rate your stress when you arrive to your physical education class. (Question 9)
5. Rate your stress after you have finished participation in your physical education class. (Question 10)

The response choices given for Question 6 were yes, no, and sometimes. The Likert scaling response choices given for Questions 9 and 10 were 1 = *low*, 2 = *medium*, 3 = *high*, and 4 = *very high*.

Quantitative Data Analysis

Analyses were performed on student response data to the survey instrument. Quantitative data analysis consisted of Pearson's chi-square tests and measures of central tendency and dispersion. Chi-square tests compared stress in the PE environment stratified by grade level. Levels of significance ($p < .05$) for the chi-squares were reported for all significant effects. SPSS 21 was used for analyses. Only observed data values were used for these summaries. Significant differences for grade level were reported for five (Questions 3, 5, 6, 9, and 10) of the nine scaling questions.

Chi-square tests showed a statistically significant difference by grade level in questions related to PE and stress. Question 3, "When I come to this physical education class, I forget about what is stressing me out," indicated an association by grade level. Students in seventh grade (37.1%) were more likely to forget about stress when coming to PE class than were students in eighth (36.5%) and ninth (26.4%) grades. The chi-square test for Question 3 was reported as seventh graders ($M = 1.70$, $SD = .877$), eighth graders ($M = 1.96$, $SD = .782$), and ninth graders ($M = 2.02$, $SD = .903$), χ^2 (4, $N = 872$) = 12.53, $p < .01$. Cramér's V effect size was .085, representing a small effect (Figure 1).

Question 5, "After participating in the class activities, I feel I can handle what is stressing me out," indicated an association by grade level. Students in seventh grade (41.7%) were more likely to respond that they could better handle stress after participating in PE class than were students in eighth (31.5%) and ninth (26.9%) grades. The chi-square test for Question 5 was reported as seventh graders (M = 1.66, SD = .856), eighth graders (M = 1.92, SD = .772), and ninth graders (M = 2.16, SD = .906), χ^2 (4, N = 872) = 17.41, $p < .01$. Cramér's V effect size was .100, representing a small effect (Figure 2).

Question 6, "I look forward to coming to my physical education class," indicated an association by grade level. Students in seventh grade (38.0%) were more likely to look forward to coming to their PE class than were students in eighth (36.5%) and ninth (26.4%) grades. The chi-square test for Question 6 was reported as seventh graders (M = 1.50, SD = .838), eighth graders (M = 1.40, SD = .805), and ninth graders (M = 1.78, SD = .940), χ^2 (4, N = 872) = 25.23, $p < .0001$. Cramér's V effect size was .120, representing a small effect (Figure 3).

Question 9, "Rate your stress when you arrive to your physical education class," indicated an association by grade level. Students in seventh grade (38.8%) reported lower stress levels before arrival to PE class than did students eighth (33.3%) and ninth (27.9%) grades. The chi-square test for Question 9 was reported as seventh graders (M = 1.68, SD = .798), eighth graders (M = 1.69, SD = .798), and ninth graders (M = 1.93, SD = .959), χ^2 (4, N = 872) = 23.54, $p < .001$. Cramér's V effect size was .116, representing a small effect (Figure 4).

Question 10, "Rate your stress after you have finished participation in your physical education class," indicated an association by grade level. Students in seventh grade (38.7%) also reported lower stress levels after participation in PE class than did students in eighth (34.8%) and ninth (26.5%) grades. The chi-square test for Question 9 was reported as seventh graders (M = 1.45, SD = .766), eighth graders (M = 1.47, SD = .820), and ninth graders (M = 1.71, SD = .911), χ^2 (4, N = 872) = 21.04, $p < .01$. Cramér's V effect size was .110, representing a small effect (Figure 5).

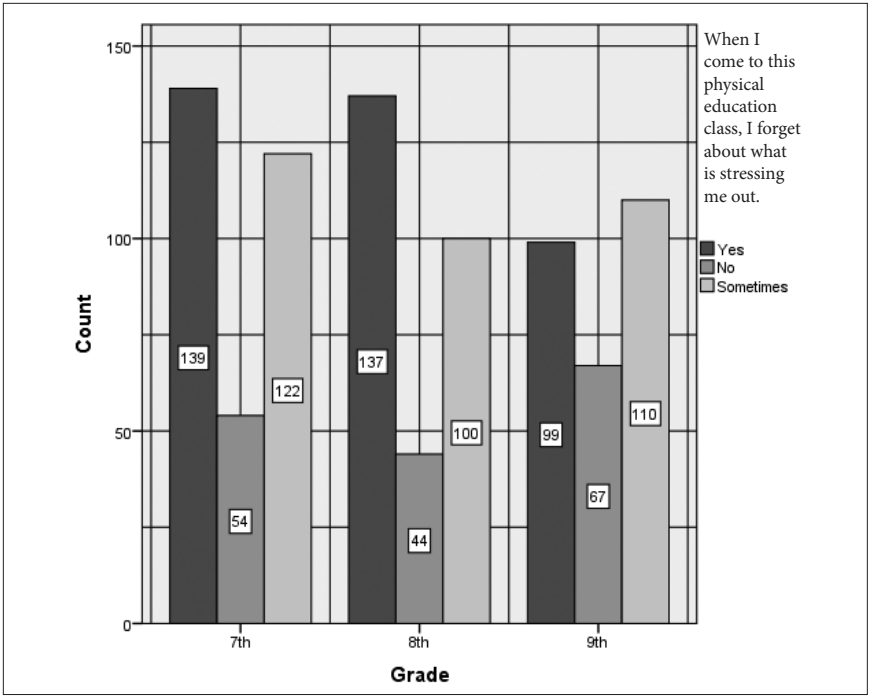

Figure 1. Response rates by grade level for Question 3.

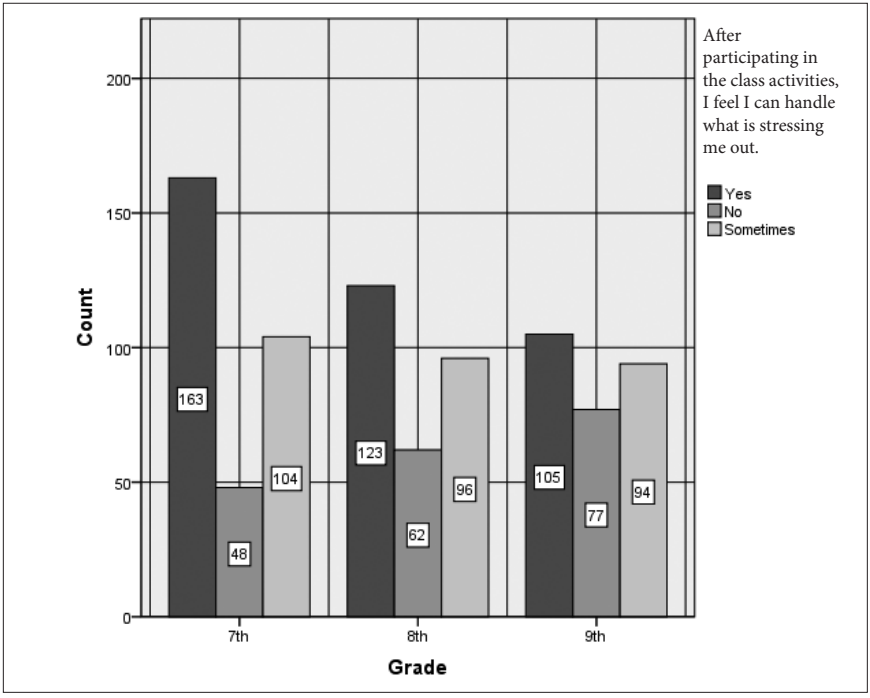

Figure 2. Response rates by grade level for Question 5.

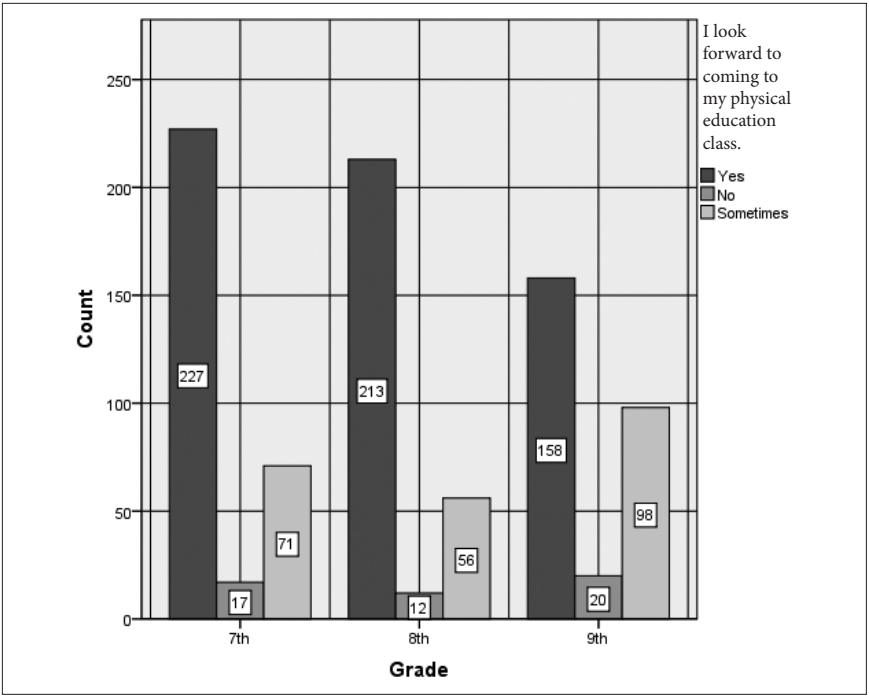

Figure 3. Response rates by grade level for Question 6.

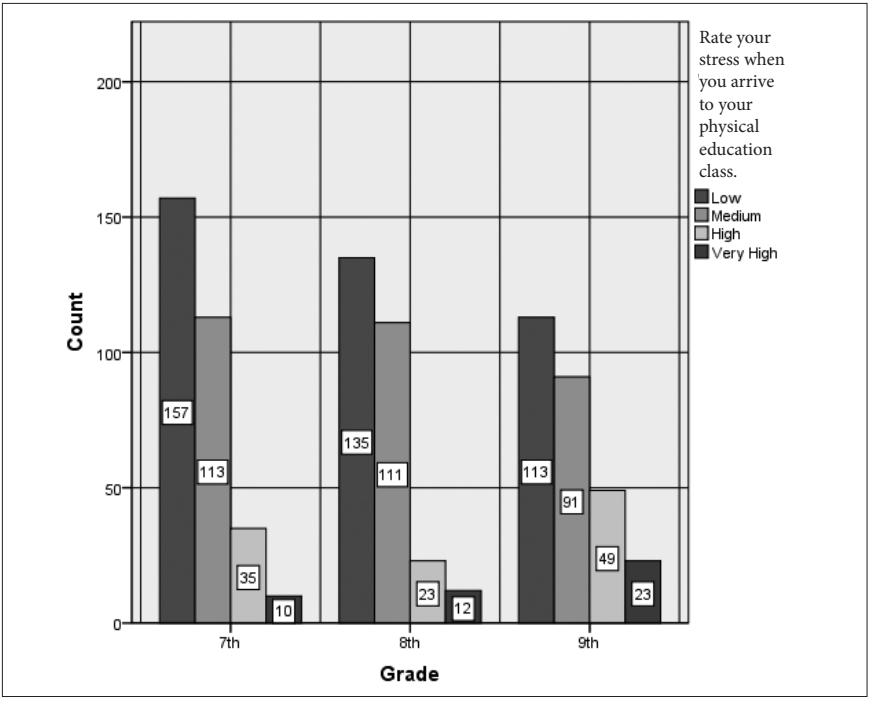

Figure 4. Response rates by grade level for Question 9.

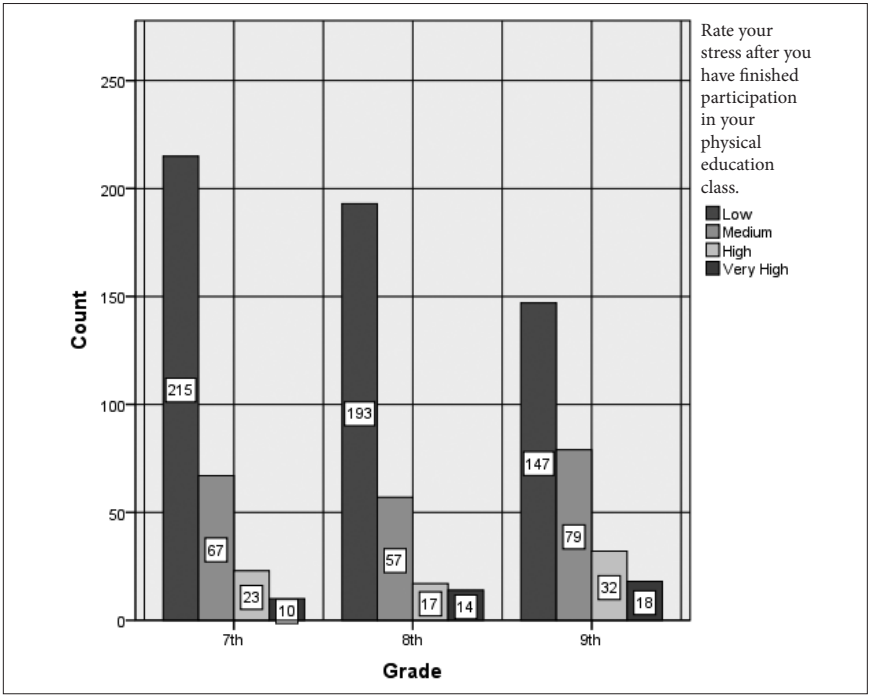

Figure 5. Response rates by grade level for Question 10.

Qualitative Follow-Up Data Analysis

Additional data results were comprised of short-answer responses from the study participants. Thematic analysis and findings are reported for four of the 12 survey questions (Questions 4, 7, 8, and 11). Participants were asked to explain and expound their responses to the four open-ended questions. Thematic content analysis was performed on open-ended responses. Referencing qualitative analysis, the investigators read and reread the content until common themes became evident for each survey question. Responses were first examined through inductive content analysis (Lincoln & Guba, 1985; Sarvela & McDermott, 1993) and emerging themes identified. A constant comparative method (Glaser & Strauss, 1967) was employed, with each unit of information first categorized and then compared and contrasted with all other units of information with the intent of linking those with similar meanings (Patton, 2002).

Participants answered questions regarding stress indices: stress after completion of PE class (Question 4), stress reduction after participation in PE class (Question 7), stress from participation in

PE class (Question 8), and participation in PE class in managing life stressors (Question 11). Analysis revealed three major themes: (a) stress mitigation from PE, (b) social bonding from physical education, and (c) PE classmates as negative stress in PE (Figure 6).

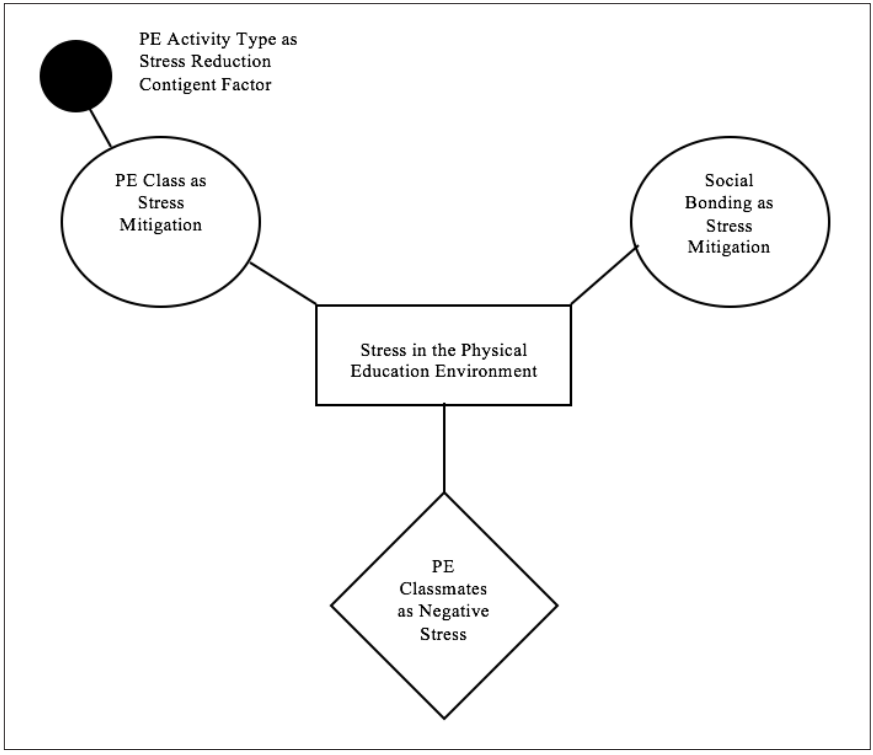

Figure 6. Stress in physical education: Major and minor themes.

Stress mitigation after participation in the physical education environment. Participant responses focused on the mitigation of stress after participation in PE: "Sometimes I forget about my stress, often doing fun things in PE"; "Yes, because I think physical activity is healthy and when I run or do physical activities, it helps get my mind off things and is like therapy"; "When I have fun I forget about the things that stress me"; "Running makes me calm"; and "After working out, my brain is empty and refreshed and ready for the next class."

Social bonding as stress reduction in the physical education environment. For social bonding as a stress reducer, responses

included "Because I can talk to friends, and physical activity can help me forget about stress"; "I get to hang out with my friends and talk to them about life"; and "I talk to my friends and play sports."

One minor theme that arose from this theme was that for stress reduction during class, stress reduction in PE was contingent on activity type. Statements included "If I enjoy the activity and get into what's happening during PE, it occasionally takes my mind off of my stress" and "Depends on what we do in PE class."

Classmates as negative stress in the physical education environment. Conversely, for the major theme of social bonding, participant responses focused on classmates as producing stress in the PE environment: "Classmates are too much," "I don't like some kids in my class," and concise responses such as "Bullies!"

Discussion

The purpose of this study was to explore grade-level differences (seventh, eighth, and ninth) among junior high school students' perceptions of the effects of participation in PE class on individual environmental stress. Findings suggest PE class helps junior high school students with stress in their lives, particularly seventh-grade students. In general, seventh graders were more likely to respond they could better handle stress after participating in PE class, to look forward to coming to their PE class, to report lower stress levels before arrival to PE class, and to report lower stress levels after participation in PE class than were than eighth and ninth graders. Overall, follow-up qualitative findings also help support quantitative results. For reference, when students left PE class, they felt their participation in class activities helped them "be more calm," "distracted me from my worries," and helped get "their mind off things." Moljord et al. (2011) studied the relations of physical activity, stress, and happiness in a sample of Norwegian adolescents, 13 to 18 years old. Moljord et al. found that adolescents with moderate or high physical activity levels reported lower stress and higher happiness than did adolescents with lower physical activity levels.

Another point of discussion references participants expressing their feelings and thoughts in regard to PE class helping them lessen stress experienced from daily stress. Sharp and Barney (2016) studied the effects of stress in students attending a university that did not require physical activity classes for graduation and in students

attending a university requiring students to take physical activity classes for graduation. Students participating in physical activity classes recorded the following statements, "I still have stress, but physical activity helps"; "I would be more cranky and restless without it"; "I feel I am in a better mood and can handle situations better"; and "It relieves my stress and problems so I can encounter them." Findings parallel with previous research and add to the literature supporting one potential beneficial mechanism for adolescents to address stress.

One of the main goals of PE is to make activities and games fun and enjoyable (National Association for Sport and Physical Education, 2009). Yet historically physical educators have used inappropriate instructional practices in activities and games that have not been fun and enjoyable for students, thus possibly creating or adding stress for the student. Barney et al. (2016) studied exercise as punishment in PE class and its effects on former students' attitudes. Participants were interviewed about their past PE experiences and the use of exercise as punishment. Participants were asked, "Was the overall classroom environment affected when students had to exercise as punishment?" Overwhelming, participants reported yes, the classroom environment was negatively affected. Additional statements included "The atmosphere usually became tense," "It's awkward to watch," "It scares the group or makes them feel uneasy," and "It made us fear the teacher." Student responses did not specifically address stress from exercise and punishment, yet the responses alluded to the notion that these experiences did not create a positive learning environment.

Implications for Physical Education Teacher Education Programs

The salutogenic conceptual framework states, "Understanding of the relation between physical activity and health, and in consequence richness to the perspectives of health in physical education" (Quennerstedt, 2008). Data and thematic content analyses show that junior high school students participating in PE class tend to report better stress management. Another implication from this study is that PE teachers should be mindful of activities students can participate in that will be most beneficial in helping students relieve stress in their lives. Table 2 outlines PE teacher education (PETE) program guidelines and their proposed associated effects on student stress in the PE environment.

Table 2
Physical Education Teacher Education Program Guidelines Impacting Stress in the Physical Education Environment

Stress-promoting experiences in physical education	• Problems with teacher or classmates • Psychological and physical violence • Pain during or after PE • Poor organization and class structure • Low perceived ability or consistent feelings of failure (Gerber, 2009)
Stress-mitigating experiences in physical education	• Create developmentally appropriate tasks • Arrange private and maximize practice sessions • Use of stations • Create a task-involved motivational climate • Encourage free, creative, individual expression • Ensure positive class climate with zero tolerance for bullying • Identify students with low perceived competence/ high trait anxiety • Establish 80% success rate to build confidence • Allow student choice or offer activities rated high enjoyment • Change student perceptions of demands and abilities • Permit students to self-evaluate and measure results • Teach relaxation techniques • Promote humanistic values • Build tolerance (Blankenship, 2013; Currie & Sumich, 2014)

Additionally, Pangrazi and Beighle (2013) suggested that when students enter class, they should be engaged in activity with active teacher interaction.

One last implication of this study is that in the preparation of their PETE majors, PETE faculty need to emphasize that student participation in class activities can result in stress management. When PETE majors graduate and teach their own classes, they can use this information to better inform parents, administrators, and the classroom teachers of the benefits of the student's activity in PE class and throughout the student's life.

Limitations

The researchers noted limitations to this study. Four junior high schools from two states participated in this study. Because the participants came from certain locales and grade levels, it may not allow a representative sampling of participants from other schools, from other grade levels, or in other geographic regions, thus limiting the generalizability of the findings. Thus, themes, conclusions, and implications are mostly applicable to those participant demographics. Research on refining PETE and the PE environment needs to be continued in new meaningful directions. PETE research should continue to incorporate diverse investigation methodology to better examine the environmental factors in the PE environment (Hassandra, Goudas, & Chroni, 2003). For more robust causal relationships between stress and physical activity to be identified, a longitudinal study design would be needed.

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