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The Impact of Adventure Education on Students' Learning Outcomes in Physical Education: A Systematic Review

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Abstract The major purpose of this study was to conduct a systematic review on adventure education or adventure-based learning in physical education (PE) between 1976 and 2018 in order to examine the effects of adventure education on students' learning outcomes in PE such as physical and psychological outcomes. The secondary purpose was to explore PE teachers' perspectives toward adventure education in PE. Sources in the literature study for analysis were searched through four electronic databases: Academic Search Complete, ERIC, PsycINFO, and SPORTDiscus. The keywords 'adventure learning,' 'adventure education,' 'physical activity,' and 'physical education' were used for the literature searches. The literature articles were selected using the following criteria: (a) published in peer-review journal; (b) adventure education or adventure-based learning applied in physical activity (PA) and PE settings; (c) examining the relationship of adventure education with physical or psychological outcomes; (d) participants must be school-aged children; (e) written in English. Based on the above criteria, 11 articles were identified and synthesized to investigate the effects of adventure education or adventure-based learning on elementary and secondary school students' physical and psychological outcomes. The results suggest that adventure education benefits the developments of school-aged students' learning outcomes such as peer relationship and emotion

Keywords: *Adventure education, physical education, physical activity, school-aged children*

1. Introduction

Adventure education or adventure-based learning is one type of physical education (PE) curricular models intending to engage students in group tasks and to challenge them in various physical activities (PA) that are not often seen in traditional PE (Lund & Tannehill, 2014). Integrated adventure-based learning and PE curriculum are based on five concepts: challenge, cooperation, risk, trust, and problem solving (Prouty, Panicucci, & Collinson, 2007). Adventure-based learning can be used to help students challenge themselves, cooperate on tasks, take real or perceived physical or emotional risks, trust in themselves and others, and solve problems with others' help and guidance in PE settings. Additionally, adventure-based learning provides a unique set of challenges for learning and maintaining information (Lund & Tannehill, 2014). Thus, teachers' instructional strategies would be important to provide students with feedback based on adventure-based learning. Given the fact that adventure-based learning is highly recommended for use in PE classes (Carlson & McKenna, 2000; Sutherland, Stuhr, & Ayvazo, 2016), it is important to explore the PE teachers' perspectives toward using adventure-based learning in PE settings. Especially, understanding preservice PE teachers' perceptions would be essential because they will become future facilitators to apply adventure education or adventure-based learning in their future classes.

Several studies have shown that adventure education or adventure-based learning can enhance physical and psychological health outcomes, such as PA levels (Gehris, Myers, & Whitaker, 2012; Li, Chung, Ho, Chiu, & Lopez, 2013; Moorman, Schlatter, & Hurd, 2007;); motivation to learn (Gilbertson & Ewert, 2015; Moos & Honkomp, 2011; Sproule et al., 2013); social interaction skills (Garst, Scheider, & Baker, 2001; Sammet, 2010; Sutherland, Ressler, & Stuhr, 2011; Sutherland & Stroot, 2010); self-esteem (Gatzemann, Schweizer, & Hummel, 2008); and psychological well-being (Li, Chung, & Ho, 2013). Although it is evident that adventure-based learning has positive relationship with other psychological factors, litter research has focused on the systematic review about curriculum effectiveness of adventure education or adventure-based learning on school-aged students' physical and psychological outcomes.

There are several literature review studies regarding adventure education or adventure-based learning. Veletsianos and Kleanthous (2009)'s study concentrated on designed teaching learning environments in classroom through online website instead of PE and PA contexts. McKenzie (2000)'s literature review study focused on how adventure-based education program could be achieved based on theories, rather than empirical research. For these reasons, this systematic review focused on how adventure education or adventure-based learning can enhance physical and psychological outcomes in school-aged students based on empirical studies. Therefore, the major purpose of this study was to examine the effects of adventure education or adventure-based learning on students' physical and psychological outcomes using a systematic review approach, and to explore preservice PE teachers' perspectives toward adventure-based learning in PE settings.

2. Method

Articles were searched through the following electronic databases: Academic Search Complete, ERIC, PsycINFO, and SPORTDiscus. The keywords 'adventure' OR 'adventure learning' OR 'adventure education' AND 'physical activity' OR 'physical education' were used for the literature search in different combinations between 1976 and 2018. The articles were selected using the following criteria: (a) published in peer-review journal; (b) adventure education applied in PA and PE settings; (c) examining relationships of adventure education or adventure-based learning with physical or psychological outcomes; (d) participants must be school-aged children; and (e) written in English.

The initial search resulted in a total of 255 articles. The Mendeley citation manager was used to search and remove the duplicated studies (Kwon, Lemieux, McTavish, & Wathen, 2015). A 200 non-duplicated abstracts were reviewed and 188 of them were eliminated based on the selection criteria. The process resulted in a total of 12 articles for the full review (See Figure 1). During the process, one article was eliminated because it did not examine physical or psychological outcome. Thus, a total of 11 articles were identified and synthesized to provide an information about how the adventure-based learning in PA settings has an effect on students' physical and psychological outcomes, such as students' PA levels, self-concept, motivation, and social interactions. Additionally, this study identified and synthesized the teachers' perspectives toward adventure-based learning in PE settings in five different articles. These five articles were collected as same as the process to search articles in this study, but using key words 'physical education teachers' AND 'teachers' AND 'preservice teachers' in a context of adventure education or adventure-based learning. Guided by Harris and colleague's (2014)'s systematic guideline, this study used content analysis to extract information from the articles. Table1 and Table 2 show the overview of each of the 11 empirical articles with the nine review categories: authors; study focus; country; participants; program composition; session length; data sources; research design and analysis; results.

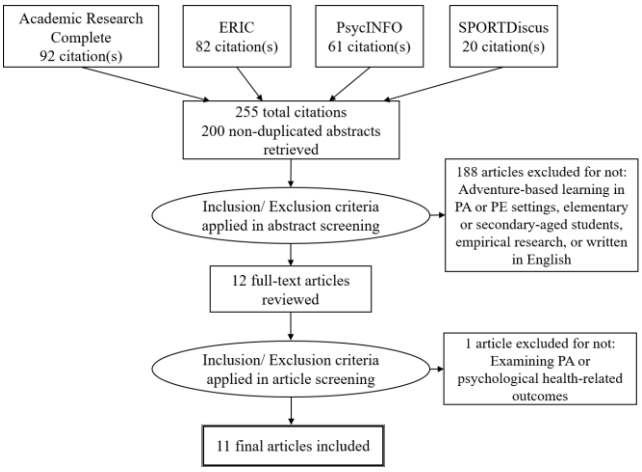

Figure 1. Article search and selection process

3. Results

3.1. Overview of articles

3.1.1. Study background

The majority of the 11 extracted studies were conducted in a Western country, with more than half in the U.S. (6), followed by Hong Kong (2), Scotland (1), Spain (1), and New Zealand (1). Two studies (Gehris et al., 2012; Li et al., 2013) mainly focused on the effects of adventure-based learning on a physical outcome (i.e., subjectively measured PA levels) and nine studies (Baena-Extremera, Granero-Gallegos, & del Mar Ortiz-Camacho, 2012; Garst et al., 2001; Gibbons, Ebbeck, Gruno, & Battey, 2018; Larson, 2007; Li et al., 2013; Scarf et al., 2017; Sproule et al., 2013; Stuhr, Sutherland, Ressler, & Ortiz-stuhr, 2015; Sutherland & Stroot, 2010) emphasized the effects on psychological outcomes (i.e., self-concept, self-perception, well-being, social and peer relationship, motivation, and resilience). All ten studies included a description of adventure-based learning or adventure education, as well as discussed what kind of activities were included in the adventure-based learning program. However, only one study showed a lack of description of adventure-based learning program composition (Larson, 2007).

3.1.2. Participants and setting

All studies examined the effects of adventure education or adventure-based learning in elementary and secondary school-aged students. Among them two studies included special populations, such as childhood cancer survivors (Li et al., 2013) and adolescent with autism spectrum (Sutherland & Stroot, 2010).

Table 1. Background, participants, settings, and design of extracted articles (n = 11)

Author(s)	Study Focus	Country	Participants	Program content
Li, et al. (2013)	Effects of integrated adventure-based training and health education program in enhancing physical activity	Hong Kong	71 Childhood cancer survivors (age 9-16 years old); 33 male and 30 female	Quantitative design; 4-day integrated adventure-based training and health education program; Big foot; Wall climbing; Mini Olympics; Two-legged run
Gehris et al. (2012)	Examining physical activity levels during the adventure-physical education lessons	U.S.	136 students (66 males, 70 females; grade 6-8); 95 white and 41 non-white.	Quantitative design; Games, initiatives, trust activities, low and high elements, and skills; ropes course (vertical climbing walls, cargo nets, and climbing ropes)
Garst et al. (2001)	Effects of outdoor adventure trips on self-perception	U.S.	58 youth adolescents (18 Hispanic, 13 African-American, 5 Native American, and 4 biracial); aged 10-17 year old; No gender mentioned	Mixed method design: Experimental group activities including hiking, caving, initiatives, and several environmental education program
Larson (2007)	Effects of adventure camp program on the self-concept	U.S.	61 adolescents with behavioral problems (aged 9-17 years); 31 in treatment group and 30 in control group	Quantitative design; No description about program content
Gibbons et al. (2018)	Effects of Team-Building Through Physical Challenges (TBPC) and Adventure Curriculum for Physical Education (ACPE) on self-conception	U.S.	397 middle school students (214 male, 183 female; grade 7-8). Randomly assigned into treatment group (TBPC or ACPE) and control group. The TBPC or ACPE embedded in regular physical education classes were implemented by physical education teachers.	Quantitative design; TBPC includes physically challenging tasks requiring elements of communication, cooperation, trust, and risk. ACPE focuses on building community, increasing self-awareness, and transferable interpersonal skills.
Li et al. (2013)	Effects of adventure program on psychological well-being of primary school children	Hong Kong	56 primary school children in experimental group; 64 in control group; 29 male, 27 female	Quantitative design; Five education sessions including health talk, game, problem solving (around 75 minutes each) within one year and day's adventure-based training camp at the end of the academic year.

Table 1. (continued)

Author(s)	Study Focus	Country	Participants	Program content
Sutherland & Stroot (2010)	Effects of adventure education trip on group dynamics	U.S.	7 adolescents (aged 10-14 year old) that included one male participant with high functioning autism spectrum (aged 13 year old); No race mentioned	Mixed method design; Three day inclusive rock climbing trip (environmental education activities, hiking, climbing, belaying and teambuilding sessions)
Sproul et al. (2013)	Exploration of adventure education on motivation and achievement goal	Scotland	224 adolescents (125 males, 99 females; *M*age = 13.2, *SD* = 0.3)	Quantitative design; 12 day outdoor and adventurous project work including walking in regions of Scotland, staying in youth hostels/bunkhouse, overnight caps in tent, teambuilding activities, mountain biking, rock climbing, and cannoning; 12 day project work
Stuhr et al. (2015)	Effects of adventure education in P.E. on students' intrapersonal and interpersonal relationship skills	U.S.	94 middle school students (64.1% Caucasian); No gender mentioned	Qualitative design; 15-lesson adventure based learning of instruction (i.e., all aboard, Elbow Tag, Group Juggle, Help Tag, group actives linked to relationship skills) during PE; 15-lesson adventure based learning unit of instruction during the start of the school year
Baena-Extremera et al. (2012)	Effects of adventure education program on intrinsic classroom satisfaction, physical self-concept, social goals	Spain	125 4th year of secondary school student (*M*age = 15.67, *SD*=.71); 76 students in experimental group; 49 students in control group); boy 59, girl 66	Quantitative design; Climbing, rock-climbing, abseiling, bungee jumping; 9 weeks adventure program
Scarf et al. (2017)	Effects of adventure education program on adolescents' resilience	New Zealand	180 adolescent; 90 (Mage =16.67) in experimental group; 90 (*M*age =16.42) in control group; 102 female	Quantitative design; Sailing the coastal waters of New Zealand for 10 days; 10-day voyage

Table 2. Study methods and results of extracted articles (n = 11)

Author(s)	Session length	Data sources	Research design & analysis	Results
Li et al. (2013)	4 days over a 6-month period (2 weeks, 2 months, 4 months, and 6 months)	Survey (Chinse University of Hong Kong: Physical Activity rating for Children and Youth)	1 experimental, 1 control group (placebo); pre-post; Inferential statistics (independent t-test and χ^2); Pairwise comparison	Greater increases of physical activity in experimental group than control group
Gehris et al. (2012)	Seven different schools; 43 lessons	SOFIT (video recording)	No control group; Video analysis for SOFIT	Lower MVPA (28%) during adventure-PE lessons than traditional PE lessons (32% to 48%)
Garst et al. (2001)	3-day outdoor adventure trips; pre-, post-, follow-up test (four month)	Survey (self-perception profiles); Qualitative: participant observation, leader journaling, and interviews	No control group; pre-post; ANOVA, Open and axial coding	Greater increase in self-concept from pre- to post-test (social acceptance, behavioral conduct), but decrease from post-test to follow-up test (after four month)
Larson (2007)	5-day adventure camping experience	Survey (Piers-Harris Children's Self-Concept Scale, 1964)	1 experimental, 1 control group; pre-post; Paired t-test; Quasi-experimental	Great increase in self-concept (intellectual and school status; popularity; happiness and satisfaction)
Gibbons et al. (2018)	45-minutes-adventure-based focused lesson (either ACPE or TBPC) once 2 weeks, a total of 14 lessons over the 7-month	Survey (Self-Perception Profile for Children)	2 experimental (either ACPE or TBPC); 1 control group; pre-post; gender differences; 3 x 2 x 2 Repeated MANOVA	Both ACPE and TBPC program in PE greater increase in self-concept than control group; ACPE was greater than TBPC for global self-worth and perceived behavioral conduct and TBPC was greater than ACPE for perceived social approval;
Li et al. (2013)	5 adventure-based education sessions for 10 months	Survey (depression, anxiety, self-esteem, quality of life)	1 experimental, 1 control group (placebo); pre-post; independent t-test for three phases (T_1, T_2, T_3).	Greater decrease depressive symptoms and anxiety levels and increase self-esteem in experimental group than control group

Table 2. (continued)

Author(s)	Session length	Data sources	Research design & analysis	Results
Sutherland & Stroot (2010)	Three day inclusive rock climbing trip	Trust check list, interview; observation; field note	No control group; pre-post; Line coding for qualitative analysis	Greater increase in group dynamics and participants became more cohesive group
Sproul et al. (2013)	12 day project work	Survey (basic psychological need, achievement goal, learning climate, intrinsic motivation, metacognition, perceived skill)	No control group; pre-post; MANOVA	Higher rated in autonomy supportive climate, autonomous motivation, perceived competence, and greater emphasis on task approach
Stuhr et al. (2015)	15-lesson adventure based learning unit of instruction during the start of the school year	Weekly journal response, small group, individual interview	No control group; pre-post; Axial coding and constant comparison method	Greater increase in social and emotional learning outcomes
Baena-Extremera et al. (2012)	9 weeks adventure program	Survey (intrinsic satisfaction classroom scale; physical self-concept; social goals-physical education)	1 experimental, 1 control group; pre-post; MANOVA	Greater increase in satisfaction/enjoyment, self-esteem, and physical condition
Scarf et al. (2017)	10-day voyage	Survey (resilience)	1 experimental, 1 control group; pre-post; MANOVA	Greater increase in adolescents' resilience

The total student sample size was 1409 and the majority students aged from 12-15 years old from these 11 articles. However, several studies did not describe provide necessary information about the participants' gender (Garst et al., 2001; Stuhr et al., 2015) and racial/ ethnic composition (Gibbons et al., 2018; Sutherland & Stroot, 2010). Five studies applied adventure-based learning to PE settings (Baena-Extremera et al., 2012; Gehris et al., 2012; Gibbons et al., 2018; Sproule et al., 2013; Stuhr et al., 2015), and the rest six studies focused on PA settings, such as adventure camp, training, and trip (Garst et al., 2001; Larson, 2007; Li et al., 2013; Li et al., 2013; Scarf et al., 2017; Sutherland & Stroot, 2010).

3.1.3. Program design and content

This literature review categorized three distinctive methodological approaches: qualitative studies (1); quantitative studies (8); and mixed-methods studies (2). Specifically, using qualitative approach, Stuhr and colleagues (2015) used an intrinsic qualitative case study design to examine the effects of adventure education in PE on students' interpersonal and intrapersonal relationship skills. Using quantitative design, two studies used a quasi-experimental design to investigate the adventure-based learning impact by including one intervention and one control group (Baena-Extremera et al., 2012; Larson, 2007). Gibbons and colleagues (2018) implemented two different adventure-based activities: Team building Through Physical Challenges (TBPC) and Adventure Curriculum for Physical Education (ACPE) in PE settings, and compared them with control condition. Five studies used true-experimental research design approach, including intervention and control groups (Baena-Extremera et al., 2012; Larson, 2007; Li et al., 2013; Li et al., 2013; Scarf et al., 2017), while two studies applied pre-experimental research design approach with only one group (Gehris et al., 2012; Sproule et al., 2013). Further, two studies applied mixed methodology (both qualitative and quantitative design; Garst et al., 2001; Sutherland & Stroot, 2010), using a variety of approaches for the qualitative assessment: (a) observations; (b) journaling; (c) interviews; (d) checklist; (e) field note.

The adventure-based learning program duration was between 3 days (Garst et al., 2001) and one academic year (Stuhr et al., 2015). The number of lessons ranged from 3 (Garst et al., 2001) to 43 lessons (Gehris et al., 2012). Problem solving activities (Garst et al., 2001; Gehris et al., 2012; Gibbons et al., 2018; Li et al., 2013; Li et al., 2013; Scarf et al., 2017; Sproule et al., 2013; Stuhr et al., 2015; Sutherland & Stroot, 2010) and rock/wall climbing (Baena-Extremera et al., 2012; Gehris et al., 2012; Li et al., 2013; Sproule et al., 2013; Sutherland & Stroot, 2010) were popularly used in adventure-learning programs. There is only one study did not report the content of adventure-based learning program (Lasron, 2007).

3.1.4. Data collection and analysis

The extracted articles applied diverse types of data collection and analysis to examine the impact of adventure-based learning on physical and psychological health-related outcomes in PE and PA setting. Most studies collected data once at the beginning and once at the end of the program, while three studies applied three or four phases of data collection, adding one (Li et al., 2013) or two (Garst et al., 2001; Li et al., 2013) follow-up tests. Survey measures were included in all quantitative and mixed-methods studies. One observational study videotaped and used the System for Observing Fitness Instruction Time (SOFIT) to collect students' PA level during the adventure-based program in a PE setting (Gehris et al., 2012).

In qualitative studies and mixed-methods studies, the researchers conducted interviews with students and made observations to identify themes that indicate student experience and attitudes toward adventure-based learning programs. Two studies accounted for trustworthiness and credibility using multiple methods (interviews, field notes, journals, and observation) to enhance the reliability and validity of the studies (Garst et al., 2001; Sutherland & Stroot, 2010), but one study lacked a description of the program (Stuhr et al., 2015).

In terms of data analysis, six studies applied a pairwise comparison T-test, analysis of variance (ANOVA), multiple regression, and multivariate analysis of variance (MANOVA) to examine the effects of adventure education or adventure-based learning on physical and psychological outcomes. However, one study using a mixed methodology approach did not describe their use of quantitative analysis (Sutherland & Stroot, 2010). Additionally, for qualitative analysis, all interview and observation data were transcribed verbatim and analyzed in order to develop themes.

3.2. Physical and psychological outcomes

3.2.1. PA levels

Two extracted studies examined PA levels by implementing adventure-based learning into PE and educational training programs. Based on students' responses about PA, Li and colleagues (2013) identified significantly higher levels of PA in the experimental group than in the control group. On the other hand, in the study using observational data collection to compare PA levels between traditional and adventure-based learning PE, Gehris and colleagues (2012) indicated that less moderate-to-vigorous physical activity (MVPA; 28%) in adventure-based learning PE than traditional PE lessons (32% to 48%).

3.2.2. Self-concept and self-perception

Based on the results of four studies (Baena-Extremera et al., 2012; Garst et al., 2001; Gibbons et al., 2018; Larson, 2007), students achieved higher self-concept and self-perception through adventure-based learning programs and PE settings. Interestingly, in a study examining an adventure-based learning program's effects among adolescents with behavioral problems, Lasron (2007) indicated that significant difference of self-concept

between the treatment group and the control group in the 9-to-11-year old age group, but no difference in the 12-to-18-year old age group. Additionally, Garst and colleagues (2001) found that after three-day outdoor adventure trips, adolescents' social acceptance domain of the self-perception increased in the pre- and post-test, but decreased in the four month-follow up test, while behavioral conduct domain of the self-perception gradually increased from pre- to the follow up test. Moreover, Baena-Extremera and colleagues (2012) examined a nine-week adventure-based learning program in a PE setting, and they found a greater increase in self-concept among secondary school students. Lastly, a study using two different adventure-based PA (i.e., ACPE, TBPC) by Gibbons and colleagues (2018) revealed that after 7-months both ACPE and TBPC program embedded in PE highly increased students' self-concept than control group. In a comparison analysis between the two adventure-based activities, ACPE was greater impact on global self-worth and perceived behavioral conduct while TBPC was greater influence on perceived social approval.

3.2.3. Social and peer relationship

Two studies examining social interaction indicated that significant increase in social relationships after undergoing an adventure-based learning PE classes and trip (Baena-Extremera et al., 2012; Sutherland & Stroot, 2010). Specifically, Baena-Extremera and colleagues (2012) showed that adventure-based learning enabled students to work together and increase self-esteem to maintain social relationships. Sutherland and Stroot (2010) demonstrated that trust between group members improved through an adventure-based learning trip.

3.2.4. Well-being

Li and colleagues (2013) used level of depression, anxiety, and self-esteem to examine well-being among primary school children, and they found that implementation of an adventure-based training program significantly improved well-being in the experimental group more than those in the control group.

3.2.5. Motivation and resilience

In a study s using self-determination theory (SDT; Deci & Ryan, 1985) and 2×2 achievement goal theory (Elliot & McGregor, 2001) as theoretical frameworks, Sproule and colleagues (2013) revealed that adventurous work experiences were linked to higher autonomy supportive climate, autonomous motivation, perceived competence, and task mastery. In addition, Scarf and colleagues (2017) found a significant improvement in adolescents' resilience and group belongingness through an adventure education program

3.3. Preservice PE Teachers' Perspectives of Adventure-Based Learning

We found five studies related to the preservice PE teachers' perspectives that can provide suggestions for using adventure-based learning in PE (Carlson & McKenna, 2000; Dillon, Tannehill, & O'Sullivan, 2017; Sutherland et al., 2011, 2016; Timken & McNamee, 2012). Among these studies, most preservice PE teachers reported that adventure education or adventure-based learning programs would positively affect students' engagement in PE classes. Specifically, the participants indicated that adventure-based PA courses can provide more insight into students' motivation than traditional PA programs do (Timken & McNamee, 2012). Moreover, adventure-based learning can create a motivational climate in PE settings that encourage students to enjoy the challenge and improve students' personal and social development (Sutherland et al., 2011). A program that integrates adventure-based learning would also promote reflective cognitive learning that helps foster an increased level of self-awareness (Sutherland et al., 2016).

In order to implement adventure-based learning in PE settings, several studies suggested that preservice PE teachers should have an opportunity to 'live curriculum' through Physical Education Teacher Education (PETE) program (Sutherland et al., 2016; Timken & McNamee, 2012). Preservice PE teachers' observing experts teaching the adventure-based learning model to K-12 students and providing preservice teachers with multiple opportunities to experience, practice, and apply the model can have a positive impact on perceptions of teaching and learning toward the adventure-based model (Carlson & McKenna, 2000; Sutherland et al., 2011, 2016). Lastly, Sutherland and colleagues (2016) suggested that the adventure-based learning should be student-centered in a way that allows for in-depth discussion.

4. Discussion

The main purpose of this systematic review was to examine the effects of adventure education or adventure-based learning on physical and psychological outcomes among elementary and secondary school students. Only very limited data reviewed showed that adventure based learning was superior than traditional instructions and curriculums. Therefore, empirical evidence supports that adventure-based learning has positive influence on physical and psychological outcomes in a PE setting. Based on the findings of the extracted articles, the majority of studies investigated the effects of adventure-based learning on affective growth and social and emotional learning outcomes. The literature review shows that adventure-based learning is closely linked to the SHAPE America's National Physical Education Standard four and five that indicates affective outcomes, such as enjoyment, self-expression, willingness, and social interaction. Additionally, social and emotional developments are important elements to use for adventure-based learning in the PE settings and PA programs.

Extracted two articles measuring PA levels in adventure-based PE and training showed conflicting findings. In these two studies, one study resulted in the

positive effect of adventure-based learning on increasing PA levels (Li et al., 2013), while the other study demonstrated that lower MVPA levels through adventure-based PE (Gehris et al., 2012). This conflicting finding might be because they used different methods to collect students' PA levels. Gehris and colleagues (2012) used the SOFIT, a subjective assessment conducted by researchers, to examine the participants PA levels during adventure-based PE lessons, but Li and colleagues (2013) used a survey, which is subjective reported by participants, to investigate children's PA. Thus, there might have been some intentional or unintentional inaccuracies in the participants' reporting and biased observation of the students' PA engagement. Future research should use objective methods to obtain accurate and reliable PA results. More research using objective tools such as accelerometers and pedometers are needed to examine PA levels in adventure-based learning PE settings or programs.

In terms of research design, several studies have indicated short-term effects (i.e., three to five days) of adventure-based learning in programs or training (Larson, 2007; Sutherland & Stroot, 2010). The short-term effects of the adventure education intervention were uncertain because it is unclear whether participants sustained their physical or psychological outcomes over time. Thus, the future research is needed to examine the long-term effects of adventure-based learning intervention on PA or psychological outcomes. Additionally, six out of 11 studies had small sample sizes to demonstrate the effects of adventure-based learning on physical and psychological outcomes. The small sample size calls the accuracy of the results into question. Thus, future research using larger sample size is warranted in order to provide more useful and meaningful information.

Lastly, a few studies have examined the effects of adventure-based learning on physical and psychological outcomes among school-aged students. Among 200 articles from four different database websites between 1976 and 2018, only 6% of articles investigated school-aged students' physical and psychological outcomes resulting from adventure education or adventure-based learning. This may be due to some challenges, such as limited resources and a lack of instructional experience to apply adventure-based learning (Carlson & McKenna, 2000; Dillon et al., 2017; Sutherland et al., 2011). Therefore, it could be important to have more studies investigating the effects of adventure-based learning in PE in order to reach holistic learning outcomes.

Technology-based interventions and programs may promote students' engagement in PA with adventure-based learning in PE settings (Alexander & Vladislav, 2015). Previous studies have proven the significant positive effect of technology on students' PA engagement in traditional PE settings (Gu, Chen, Jackson, & Zhang, 2018; Lubans, Morgan, & Tudor-Locke, 2009). A study regarding the effects of adventure-learning PE on students' PA reported that the adventure-based learning PE group's MVPA levels were lower than the traditional PE group (Gehris et al., 2012); therefore, implementing technology tools such as pedometer into adventure-learning may increase school-aged students' PA levels. Moreover, it would be interesting to investigate whether integrating technology into adventure-based learning can increase students' MVPA levels.

Regarding preservice teachers' perspectives toward the incorporation of adventure-based learning in PE, previous studies have also suggested that it would be important for PETE programs to provide preservice teachers with multiple opportunities to experience, practice, and lead the debriefing process. In doing so, preservice teachers can implement adventure-based learning in PE settings and to become effective PE teachers in the future (Dillon et al., 2017; Sutherland et al., 2011; Timken & McNamee, 2012).

This study had some limitations that need to be addressed. First, PA levels in the extracted studies related to adventure-based PE and training were measured by subjective methods (i.e., survey and observation; Gehris et al., 2012; Li et al., 2013). Since there were no studies to examine school-aged children's PA levels objectively in adventure-based learning settings, it might be difficult to conclude that adventure-based learning contribute to school-aged students' PA levels. Secondly, PE teachers' perspectives toward adventure education or adventure-based learning was limited. To our knowledge, few studies have examined PE teachers' perception about adventure-based learning in previous published papers. Thus, more research is needed to examine PE teachers' perspectives of implementing adventure-based learning in PE settings.

In conclusion, the results of the current study suggest that adventure education or adventure-based learning in PA and PE settings benefit physical and psychological outcomes in school-aged children. Specifically, incorporating adventure-based learning in PA and PE settings can be beneficial for school-aged children to develop self-concept/perception because adventure-based activities encourage them to engage in problem solving and task challenge (Cosgriff, 2000; Lund & Tannehill, 2014). Developing physical and psychological learning domains are essential goals in PE (National Association for Sport and Physical Education, 2004); therefore, adventure-based learning play an important role in achieving school-aged children' learning outcomes in PE settings.

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