



## “And I still remember it to this day”: A qualitative exploration of retrospective memories of school-based recess

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### ABSTRACT

**Objectives:** Previous research has shown the most common memory of physical education (PE) was embarrassment, and that childhood memories of PE relate to physical activity (PA) attitude, intention, and sedentary behavior in adulthood [13]. Recess memories may have a similar effect on adult attitudes towards PA, given that recess is a physically active part of the school day, yet is more autonomous and less supervised than PE. Recent literature has supported this, as Massey and colleagues (2021b) reported memories of recess enjoyment were associated with PA enjoyment in adulthood, whereas negative recess memories were associated with social isolation. In an effort to better understand recess memories, and how they may be related to adult behaviors, the purpose of this study was to examine qualitative descriptions of adults' worst recess memories as it related to physical and social health.

**Study design:** Mixed methods design; inductive content analysis and analysis of covariance.

**Methods:** As part of a larger project, 433 participants between the ages of 19 and 77 ( $M = 44.91$ ;  $SD = 15.35$ ) were asked to recall their worst recess memories and the grades in which those memories occurred. Participants identified as predominantly female (52%), White (72%), and college educated (46%). Data analysis was conducted via an inductive content analysis by three research team members.

**Results:** The most common negative memories included isolating experiences, physical injuries, victimization, and contextual factors (e.g., weather). Through a series of analysis of covariance, self-reported isolation and self-efficacy of exercise were significantly related to participants with social isolation and physical injury memories respectively.

**Conclusions:** This study adds to a growing line of research documenting the importance of recess as a developmentally impactful environment with implications for physical and emotional health.

### 1. Introduction

Physical activity (PA) and play have continuously been shown to contribute to children's physical, social, emotional, and cognitive development (e.g., Ref. [1,2]). In particular, elementary school recess serves as an important environmental context for children's PA and social development [3], as positive developmental outcomes are associated with this time period. Recess, also referred to as break time, provides children a break from structured schoolwork with opportunity to engage in free play and activity, typically outdoors (Stupiansky & Findlay, 2001). Children obtain between 17 and 44 percent of their school day PA at recess, despite it comprising about 4 percent of the school day [4]. The recess environment also provides benefits for a range of psychosocial developmental outcomes such as social competence and

classroom adjustment [5]. Additionally, teachers report more adaptive classroom behavior for children with consistent and high-quality daily recess [6,7]. Further, high-quality recess is associated with resilience and executive functioning [7], and multiple recesses per day can decrease chronic stress as measured by hair cortisol [8]. Yet, despite these documented positive effects, recess can be a challenging environment for children to navigate due to perceptions of individual physical ability, gender role reinforcement, peer influence, and a lack of adequate space and/or facilities [9]. Furthermore, victimization and bullying in the schoolyard may be detrimental to a sense of belonging and positive affective experiences at recess [10].

Brand and Ekkekakis [11] documented that affective valuations of PA contexts can impact future PA behaviors, underscoring the important role school environments can have on future health-related behaviors.

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Ascribing to the theory that positive exercise associations increase exercise behavior, one must consider that if affective exercise valuations are negative, individuals may avoid PA settings, particularly when self-regulatory resources are not strong enough to overcome negative valuations of the activity [12]. While the benefits of exercise are widely acknowledged, previous negative experiences or memories of PA may inhibit individuals from being active [11,12]. Accordingly, Ladwig and colleagues (2018) commented on the saliency of negative memories associated with PE and how that influenced behavior even decades later. Most often, these negative memories are associated with embarrassment before peers [13]. In fact, adults who reported being picked last for a sport team as a negative memory associated with childhood PA, also exhibit lower levels of PA in adulthood [13,14]. In addition, a lack of perceived competence may trigger negative memories about PA experiences in recess and PE, as children who are less skilled at PE activities describe their experiences as “humiliating,” “frustrating,” and “embarrassing” [15]. Similarly, Massey and colleagues (2021b) examined recess memories given the autonomy involved in recess, vis-à-vis other times during the school day. Notably, recess is one of the first environments in which children make discretionary choices for spending their free time, which could plausibly affect discretionary time choices across the lifespan. Massey and colleagues (2021b) reported that remembered recess enjoyment from childhood was associated with current PA enjoyment among adults.

Expanding on this research, the current study investigated individuals’ worst reported memories from recess. It explored what memories were most salient in adulthood and categorized these recalled negative memories. Further, we examined how type of memory was associated with current determinants of PA and social health. In doing so, we hypothesized that negative recess memories that were social in nature (e.g., bullying, harassment, victimization) would be related to current health beliefs, whereas those that were physical (e.g., injury) or contextual (e.g., weather) would not.

## 2. Methods

### 2.1. Participants

Following ethical approval, participants were recruited through Prolific ([www.prolific.co](http://www.prolific.co); [16]), an online platform for virtual recruitment and data collection. Prolific’s data is comparable to other online recruitment methods [17] and includes various quality checks [18]. In total, 433 participants were included in the current study. The sample was originally recruited to ensure sufficient power for model convergence to detecting meaningful effects within a latent variable modeling analysis framework. We did not specifically power the qualitative responses, but rather stratified the sampling frame to be as representative as possible of the population of the United States of America (USA). Despite this, the sample was under-representative of the Hispanic/Latino population in the United States (Table 1). Interested participants provided informed consent prior to accessing the survey. The mean survey completion time was approximately 13 min and 18 s, and upon completion of the survey, participants were compensated \$2.00 United States Dollars for their time.

### 2.2. Measures

#### 2.2.1. Demographic characteristics

Demographic information was collected for all participants, including age, educational level, gender identity, race, and annual household income (see Table 1).

#### 2.2.2. Retrospective recess memories

Using open-ended questions after the demographic questionnaire, we asked participants to recall and describe their worst memories from recess, if any. Specifically, participants were asked to “please describe

**Table 1**

Percentage/proportion of age, gender, educational level, and ethnicity in sample (n = 433).

Category	Variables	Percentage/Proportion of Participants
Age	19–25y	11%/46
	26–50y	50%/218
	51–77y	39%/168
	Missing	0.2%/1
Gender	Male	47%/204
	Female	52%/224
	Non-binary	0.7%/3
	Other	0.5%/2
Educational Level	< High school diploma	0.5%/2
	High school diploma	10%/44
	Some college	25%/107
	College degree	46%/198
	Advanced degree	19%/82
Ethnicity	White	72%/311
	Black	13%/58
	Asian American	6%/27
	Latinx	5%/20
	Other	3%/15
	Native American	0.5%/2

your worst memory from recess.” In addition, if participants reported a memory, they were also asked to indicate the grade level(s) during which their memories occurred.

#### 2.2.3. Physical activity

To measure PA, participants completed the International Physical Activity Questionnaire (IPAQ) – Short Form [19]. The IPAQ is a self-report measure of vigorous, moderate, walking, and sitting activity over a seven-day period. For each of these categories, participants reported the frequency (number of days per week) and duration (minutes) of their activity. Metabolic equivalent (MET) minutes per week were calculated for vigorous-intensity, moderate-intensity, and walking activity using the MET values and formula (e.g., moderate MET-minutes/week = 4.0 METs x moderate-intensity activity minutes per day x moderate days per week). Frequency and duration were multiplied by a corresponding MET value for each category (vigorous-intensity = 8.0 METs; moderate-intensity = 4.0 METs; walking = 3.3 METs) to obtain the MET-minutes per week (e.g., 3.3 METs walking x 60 min x 5 days = 990 MET-minutes per week).

#### 2.2.4. Physical activity enjoyment

PA enjoyment was measured using the eight-item version of the Physical Activity Enjoyment Scale (PACES; [20]). Participants were asked to rate the following: “How you feel at the moment about the PA you have been doing” using a seven-point rating scale. Internal reliability, as measured by  $\omega$ , was 0.93.

#### 2.2.5. Self-efficacy

To measure self-efficacy, four items from the Barriers for Self-Efficacy Scale (BARSE; [21]) were used. Participants responded on a 0 to 100 sliding scale (0 representing no confidence, 50 representing moderate confidence, and 100 representing high confidence) in their belief in their ability to exercise three times per week over the next three months. Prompts included, “if the weather was really bad”; “if I was on vacation”; “if an instructor did not offer me any encouragement”; and “if I was under personal stress of some kind.” Internal reliability as measured by  $\omega$  was 0.82.

#### 2.2.6. Social isolation

To measure social isolation, six items of the Patient-Reported Outcomes Measurement Information System (PROMIS) Short Form 2.0 – Social Isolation 6a scale were used. Participants rated statements on a

five-point scale (1 = “Never,” 5 = “Always”). Examples of the items include “I feel that people barely know me” or “I feel isolated even when I am not alone.” Scores were converted to standardized *t*-scores for analysis. Internal reliability as measured by  $\omega$  was 0.92.

### 2.3. Data analysis

Prior to data analysis, all data were screened for patterns of missingness. Data were screened for careless responses, with no issues being flagged. Specifically, we checked that all participants responded uniquely to open-ended questions, no participant response time was below 2 s per item, and no participant response time was below 2 standard deviations (SD) of the mean [22]. All surveys that were completed in less than 5 min ( $n = 10$ ) were manually inspected. To screen for multivariate outliers, Mahalanobis distance was examined using SPSS v25. We used  $p$ -values  $<.001$  as a cut-off to identify outliers. Ten cases (1.9% of the sample) were identified as outliers, all of which contained unreliable PA data (i.e.,  $>15,500$  MET minutes per week). These PA data were designated as missing data.

Worst recess memories were analyzed using content analysis through an iterative consensus process. Two authors independently coded the raw data. Initial codes were compared and discussed. Team members engaged in self-reflective, critical discussions about how data should be categorized while considering the content of the responses and challenging each other’s assumptions. Inductive codes were grouped into larger units and then into lower and higher order themes. At each stage, two authors worked to reach a coding consensus, with a third team member helping to reconcile any differences in coding. Following the development of a coding scheme that included raw meaning units, lower order themes, and higher order themes, the senior author audited the coding process to serve as a critical sounding board and encourage critical reflections in the data analysis process [23]. Finally, each participant’s response was then re-coded at the participant level (i.e., every participant was coded with one lower-order theme and one higher-order theme that best captured their response) for use in quantitative analysis.

A series of one-way analysis of covariance (ANCOVA) were used to examine differences in PA, PA enjoyment, self-efficacy for PA, and social isolation between participants with different types of recess memories. Each analysis controlled for age, gender identity, race, and socioeconomic status. Bonferroni *post hoc* comparisons were used when a significant  $F$  value was reported (alpha level of 0.05). Eta-squared ( $\eta^2$ ) was calculated as a measure of effect size.

## 3. Results

Overall, 433 participants provided responses of their worst recess memory that were used in analysis. Following the content analysis, 13 lower-order themes and four higher-order themes were constructed (see Table 2). The largest proportion of negative memories were reported in 5th grade

### 3.1. Negative recess memories

Negative recess memories were categorized by the following higher-order themes: 1) isolating experiences, 2) physical injuries, 3) victimization experiences, and 4) contextual memories. Victimization experiences were the most commonly coded response with 41.3% of coded responses representing this theme. Sources of victimization came from both peers and teachers. Lower-order themes included physical bullying, verbal bullying, sexual assault, harassment, and punishment from teachers. The next most prominent negative recess memory was physical injuries, which accounted for 22.9% of coded responses. Physical injuries included minor injuries, major injuries (e.g., broken bones, concussions), and witnessing injuries of others. Isolating experiences accounted for 18.2% of coded responses. This theme included exclusion, rejection, and embarrassment. Finally, contextual memories accounted

**Table 2**  
Themes and frequency counts for worst memory responses.

Higher-Order Theme	n%	Lower-Order Theme	Example Response
Victimizing Experiences	41.3%	Physical bullying	I was bullied by a kid named Jake who physically attacked me to the point where he grabbed me by my hood and swung me around and threw me. (4th Grade, Female, White)
		Verbal bullying	My worst memory was when some girls were making fun of my weight. (4th Grade, Female, Latinx)
		Sexual Assault	A boy pushed me down on the playground and started humping on me ... I was terrified of him from then on. (4th Grade; Female; White)
		Harassment	When I was a child other classmates threatened me (3rd/4th Grade, Male, Latinx)
		Punishment from teachers	When I was in the 4th grade the teacher slapped my face. It was out on the playground, and I can’t remember exactly what I did. I may have cursed. I know I had lost my temper. We had been playing a game, I think. Anyway, it happened so fast that I was stunned. I remember crying and sobbing with my head on my desk after we returned to the classroom. I have never forgotten it. On some level it changed me forever, and I mean in a negative way. (5th Grade, Male, Asian American)
Physical Injuries	22.9%	Minor injuries	While playing soccer, I was hit in the head by a well kicked ball. It knocked me down and caused dizziness. (5th Grade; male; white)
		Major injuries	I slipped on some gravel and basically face-planted, sliding down an asphalt hill. My lip split open up to my nose and I had to go to the hospital to get stitches. (Kindergarten; female; white)
		Witnessing injuries of others	One memory that I can remember details of is of one of my classmates falling off the monkey bars and injuring her head badly enough to leave in an ambulance. It was scary to witness and affected me later by making me slightly scared of falling off the monkey bars too. (2nd Grade; female; white)
Isolating Experiences	18.2%	Exclusion	I was being deliberately ignored by my best friend in favor of his new friend. I was hurt and told an authority figure who was sympathetic and scolded them. (2nd Grade; Male; Latinx)
		Rejection	Getting picked last for the team – happened multiple times (Grade 4; female; white)
		Embarrassment	My worst memory was that one time I got sick and threw up. We had finished our lunch and went outside to play in the sun. It was very hot that day. We were playing tag and chasing each other around. Somehow, I started feeling dizzy and then I threw up. All the kids in my class

(continued on next page)

**Table 2** (continued)

Higher-Order Theme	n%	Lower-Order Theme	Example Response
Contextual Memories	17.6%	Weather-related	made fun of me. It was very embarrassing. (Grade 3, Asian American, Male)
		No negative memory	Having to stand with nothing to do when it was very cold and raining (Grade 5; female; white) I have no bad memories of recess. (Grade 1–6; female; white)

for 17.6% of coded responses. This theme included weather-related memories (e.g., raining, having to stay indoors) and participants who explicitly noted that they did not have negative memories (only positive) from recess.

**3.2. Differences in recess memories and adult health outcomes**

Results of a one-way ANCOVA showed that self-reported social isolation,  $F(3, 403) = 4.06, p = .007$ , and self-efficacy for exercise,  $F(3, 403) = 2.71, p = .045$  were significantly different between participants with different recess memories (Table 3). Post-hoc analyses revealed that those who noted their worst recess memory was an isolating experience had higher levels of current social isolation ( $M = 53.22$ ) when compared to those reporting injuries ( $M = 49.12, p = .013$ ) and contextual memories ( $M = 49.28, p = .034$ ) as their worst recess memory. Additionally, those who reported physical injury as their worst memory reported significantly higher levels of self-efficacy for PA ( $M = 59.03$ ) than those reporting isolating experiences as their worst reported memory ( $M = 47.36, p = .208$ ). The results of a one-way ANCOVA showed no significant differences in PA behaviors and PA enjoyment based on type of recess memory ( $p > .05$ ).

**4. Discussion**

Research on the long-term impacts of early school-based PA experiences, particularly recess, is limited. How children choose to enjoy their time at recess has the potential to foster a healthy relationship with PA across their lifespan. Current research on the short-term effects of recess on children include an increase in PA, executive functioning, and social competence [3,5,24]. Emerging evidence suggests that these early experiences may shape attitudes and behaviors toward PA over time [13, 14,25]. Affective experiences during PA at recess may impact how active and what activities children habituate, thereby significantly impacting how individuals conduct their leisure time in the future. As such, the purpose of the present study was to examine qualitative descriptions of

**Table 3**  
One-way analysis of covariance (ANCOVA) examining differences in PA enjoyment, social isolation, self-efficacy for PA, self-reported PA, and age.

Measure	M (SD)	df	F	$\eta^2$	p
<b>PA Enjoyment</b>	37.84 (10.32)	3 423	.567	.004	.637
<b>Social Isolation</b>	50.93 (8.96)	3 431	4.44	.031	.004
<b>PA Self-efficacy</b>	52.75 (26.87)	3 412	3.049	.022	.029
<b>Weekly MET minutes</b>	3206.04 (4052.93)	3 317	1.158	.011	.326

M: mean, SD: standard deviation, df: degrees of freedom, F: F-ratio,  $\eta^2$ : eta squared, p: p-value;  
PA Enjoyment: measured on a 7-point Likert scale; Social Isolation: measured on a 5-point Likert scale; PA Self-efficacy: measured on a 0–100 sliding scale; PA: measured by weekly MET minutes of activity.

adults’ worst recess memories and their association with current aspects of PA and social health.

Results indicated that those whose worst memories were isolating experiences reported higher levels of social isolation in adulthood. These results are noteworthy considering previous research suggesting substantial social isolation and exclusion in elementary school can lead to distress in adulthood [26]. Specifically, social isolation in general has been associated with adverse mental health outcomes including anxiety, elevated cortisol levels, impaired cognitive development, depressive symptoms, suicidal ideation, and cardiovascular disease [27–30]. Additionally, social exclusion has been linked to potential setbacks in social and emotional development [31,32] and potentially higher BMI in adulthood [26]. While research has established that social isolation and low PA are related [33], it is important to note that this study did not find significant differences in PA enjoyment or PA behaviors across memories in the present sample. Methodological differences and sample characteristics may have contributed to these inconsistencies as the focus on worst memory (as opposed to most frequently occurring memory or most common experiences) may overlook other more salient influences. Furthermore, the composition of the participant pool exhibited substantial variability. This is important to consider as recess behaviors and norms have evolved over time.

Another notable finding in the current study was that participants who reported their worst recess memory as a physical injury had significantly higher levels of self-efficacy toward PA. Through a developmental lens, this finding may suggest that children who took risks during play may have better adapted to challenges [34,35]. Risky play often involves vigorous PA, boundary testing, and skill mastery [34,36] leading to physical benefits, as well as the development of emotional resilience and self-confidence through an increase in ability to assess risks, make judgments, and cope with fear and uncertainty [34,35]. Self-efficacy may increase as children become more proficient in navigating these situations. Children experiencing physical injury may have had higher levels of PA as children, and as such, increased their self-efficacy of PA over time. Evidence suggests that risky play offers more health benefits to children than those avoiding risky play, and limiting these opportunities may result in other negative outcomes such as fearfulness and anxiety [34,35,37]. This study contributes to the growing research that risky play may offer benefits to social and physical health.

**4.1. Practical implications**

The current study contributes to the growing evidence base on perceptions of early PA environments and their influence on current behaviors. These findings highlight the importance of recess experiences in elementary school and suggest a need to shift the focus from physical injury prevention to addressing social injury (i.e., experiences that result in social or emotional harm) while encouraging risk taking in play. Social injury prevention can begin at recess through strategies such as cooperative games to promote inclusiveness between peers [38,39], training supervisors to be seen as role models which promote positive interpersonal relationships [40], and designing inclusive playgrounds and outdoor areas that are accessible to students with diverse abilities [41,42]. Schools are vital in shaping children’s behaviors and attitudes, and implementing these changes could improve physical, emotional, and academic development in childhood [43] while reducing the chance of social isolation in adulthood [27,30].

Some research and policies have shifted from physical injury prevention [44,45] to promoting risky play for social and emotional health [34,36]. Yet, despite benefits, risky play has been declining over time [34], with parents, teachers, and supervisors expressing uncertainty about the safety of their children [46,47]. To promote risky play, we suggest creating an environment that balances challenge and safety through training in safety protocols, education about the benefits of risky play, and communicating school philosophy. Hence, providing



training to recess supervisors on the importance of risky play can foster an environment that supports children's exploration and reduces adult intervention [47].

#### 4.2. Limitations and future directions

These findings should be examined alongside limitations. To begin with, the study focused on the impact of a single memory rather than the influence of the most frequent or prominent adverse memories. It is possible that more salient memories yielded stronger relationships with PA and PA enjoyment in adulthood. Next, the limited representation of social isolation experiences (18% of respondents) in this study may not take into account participants that may have felt social isolation in their recess memories as children but did not emerge as their worst memory during the prompt. Therefore, the findings may not fully capture the experiences and effects of social isolation in childhood. Additionally, some physical injury codes included those who witnessed an injury rather than experiencing it firsthand. Although there is still a vicarious learning component of witnessing injury, it is important to note. It is also worth noting that there were possible uncontrolled confounding variables, such as athletic ability and sport enjoyment, may have influenced the results. Indeed, previous research has shown that recess experiences may function as a result of physical competence [48]. Finally, retrospective studies, in general, have inherent limitations such as recall bias and selection bias [49,50]. Further investigation is suggested to explore the nuances of children's recess experiences and their long-term impact on PA behaviors and enjoyment.

#### Ethical approval

Ethical approval for this survey was approved by the Internal Review Board of Oregon State University, reference no. 2020-0631.

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#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### References

- V.C. Hodges, E.E. Centeio, C.F. Morgan, The benefits of school recess: a systematic review, *J. Sch. Health* 92 (10) (2022) 959–967, <https://doi.org/10.1111/josh.13230>.
- C.L. Ramstetter, R. Murray, A.S. Garner, The crucial role of recess in schools, *J. Sch. Health* 80 (11) (2010) 517–526, <https://doi.org/10.1111/j.1746-1561.2010.00537.x>.
- W.V. Massey, M.B. Stellino, S.P. Mullen, J. Claassen, M. Wilkison, Development of the great recess framework – observational tool to measure contextual and behavioral components of elementary school recess, *BMC Publ. Health* 18 (394) (2018), <https://doi.org/10.1186/s12889-018-5295-y>.
- H. Erwin, M. Abel, A. Beighle, M.P. Noland, B. Worley, R. Riggs, The contribution of recess to children's school-day physical activity, *J. Phys. Activ. Health* 9 (3) (2012) 442–448, <https://doi.org/10.1123/jpah.9.3.442>.
- A.D. Pellegrini, K. Kato, P. Blatchford, E. Baines, A short-term longitudinal study of children's playground games across the first year of school: implications for social competence and adjustment to school, *Am. Educ. Res. J.* 39 (4) (2002) 991–1015, <https://doi.org/10.3102/00028312039004991>.
- R.M. Barros, E.J. Silver, R.E.K. Stein, School recess and group classroom behavior, *Pediatrics* 123 (2) (2009) 431–436, <https://doi.org/10.1542/peds.2007-2825>.
- W.V. Massey, D. Perez, L. Neilson, J. Thalken, A. Szarabajko, Observations from the playground: common problems and potential solutions for school-based recess, *Health Educ. J.* 80 (3) (2021) 313–326, <https://doi.org/10.1177/0017896920973691>.
- K.J. Kirby, Comparisons of Play, Chronic Stress Levels, and Body Composition in Elementary School Children of Six Public Schools, Texas Christian University]. ProQuest Dissertations Publishing, 2022. Publication No. 29170791 [Master's thesis].
- C.S. Pawlowski, J. Schipperijn, T. Tjørnhøj-Thomsen, J. Troelsen, Giving children a voice: exploring qualitative perspectives on factors influencing recess physical activity, *Eur. Phys. Educ. Rev.* 24 (1) (2018) 39–55, <https://doi.org/10.1177/1356336X16664748>.
- L. McNamara, K. Lodewyk, N. Franklin, Recess: a study of belongingness, affect, and victimization on the playground, *Child. Sch.* 40 (2) (2018) 114–121, <https://doi.org/10.1093/cs/cdy006>.
- R. Brand, P. Ekkekakis, Affective-reflective theory of physical inactivity and exercise, *German Journal of Exercise and Sport Research* 48 (1) (2018) 48–58, <https://doi.org/10.1007/s12662-017-0477-9>.
- P. Ekkekakis, R. Brand, Affective responses to and automatic affective valuations of physical activity: fifty years of progress on the seminal question in exercise psychology, *Psychol. Sport Exerc.* 42 (2019) 130–137, <https://doi.org/10.1016/j.psychsport.2018.12.018>.
- M.A. Ladwig, S. Vazou, P. Ekkekakis, "My best memory is when I was done with it": PE memories are associated with adult sedentary behavior, *Translational Journal of the American College of Sports Medicine* 3 (16) (2018) 119–129, <https://doi.org/10.1249/TJX.0000000000000067>.
- B.J. Cardinal, Z. Yan, M.K. Cardinal, Negative experiences in physical education and sport: how much do they affect physical activity participation later in life? *J. Phys. Educ. Recreat. Dance* 84 (3) (2013) 49–53, <https://doi.org/10.1080/07303084.2013.767736>.
- P.A. Portman, Who is having fun in physical education classes? Experiences of sixth-grade students in elementary and middle schools, *J. Teach. Phys. Educ.* 14 (4) (1995) 445–453, <https://doi.org/10.1123/jtpe.14.4.445>.
- S. Palan, C. Schitter, Prolific.ac—a subject pool for online experiments, *Journal of Behavioral and Experimental Finance* 17 (2018) 22–27, <https://doi.org/10.1016/j.jbef.2017.12.004>.
- E. Peer, L. Brandimarte, S. Samat, A. Acquisti, Beyond the Turk: alternative platforms for crowdsourcing behavioral research, *J. Exp. Soc. Psychol.* 70 (2017) 153–163, <https://doi.org/10.1016/j.jesp.2017.01.006>.
- Prolific, Online Participation Recruitment for Surveys and Market Research, 2018. Retrieved from, <https://www.prolific.co/>.
- C.L. Craig, A.L. Marshall, M. Sjöström, A.E. Baumann, M.L. Booth, B.E. Ainsworth, M. Pratt, U. Ekelund, A. Yngve, J.F. Sallis, P. Oja, International physical activity questionnaire: 12-country reliability and validity, *Med. Sci. Sports Exerc.* 35 (8) (2003) 1381–1395, <https://doi.org/10.1249/01.MSS.0000078924.61453.FB>.
- S. Mullen, E.A. Olson, S.M. Phillips, A.N. Szabo, T.R. Wójcicki, E.L. Mailley, N. P. Gothe, J.T. Fanning, A.F. Kramer, E. McAuley, Measuring enjoyment of physical activity in older adults: invariance of the Physical Activity Enjoyment Scale (PACES) across groups and time, *Int. J. Behav. Nutr. Phys. Activ.* 8 (2011) 103, <https://doi.org/10.1186/1479-5868-8-103>.
- E. McAuley, The role of efficacy cognitions in the prediction of exercise behavior in middle-aged adults, *J. Behav. Med.* 15 (1992) 65–88, <https://doi.org/10.1007/BF00848378>.
- M.K. Ward, A.W. Meade, Applying social psychology to prevent careless responding during online surveys, *Appl. Psychol.* 67 (2) (2018) 231–263, <https://doi.org/10.1111/apps.12118>.
- B. Smith, K.R. McGannon, Developing rigor in qualitative research: problems and opportunities within sport and exercise psychology, *Int. Rev. Sport Exerc. Psychol.* 11 (1) (2017) 101–121, <https://doi.org/10.1080/1750984X.2017.1317357>.
- S.J.H. Biddle, S. Ciaccioni, G. Thomas, I. Vergeer, Physical activity and mental health in children and adolescents: an updated review of reviews and an analysis of causality, *Psychol. Sport Exerc.* 42 (2019) 146–155, <https://doi.org/10.1016/j.psychsport.2018.08.011>.
- W.V. Massey, A. Szarabajko, J. Thalken, D. Perez, S.P. Mullen, Memories of school recess predict physical activity enjoyment and social-emotional well-being in adults, *Psychol. Sport Exerc.* 55 (2021) 101948, <https://doi.org/10.1016/j.psychsport.2021.101948>.
- R.E. Lacey, M. Kumari, M. Bartley, Social isolation in childhood and adult inflammation: evidence from the national child development study, *Psychoneuroendocrinology* 50 (2014), <https://doi.org/10.1016/j.psyneuen.2014.08.007>.
- I.L. de L. Almeida, J.F. Rego, A.C.G. Teixeira, M.R. Moreira, Social isolation and its impact on child and adolescent development: a systematic review, *Revista Paulista de Pediatria* 40 (2021) e2020385, <https://doi.org/10.1590/1984-0462/2022/40/2020385>.
- A. Caspi, H. Harrington, T.E. Moffitt, B.J. Milne, R. Poulton, Socially isolated children 20 years later: risk of cardiovascular disease, *Arch. Pediatr. Adolesc. Med.* 160 (8) (2006) 805–811, <https://doi.org/10.1001/archpedi.160.8.805>.
- A. Danese, T.E. Moffitt, H. Harrington, B.J. Milne, G. Polanczyk, C.M. Pariante, R. Poulton, A. Caspi, Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers, *Arch. Pediatr. Adolesc. Med.* 163 (12) (2009) 1135–1143, <https://doi.org/10.1001/archpediatrics.2009.214>.

- [30] R. Lay-Yee, T. Matthews, T. Moffitt, R. Poulton, A. Caspi, B. Milne, Are trajectories of social isolation from childhood to mid-adulthood associated with adult depression or suicide outcomes, *Soc. Psychiatr. Psychiatr. Epidemiol.* 58 (3) (2023) 373–382, <https://doi.org/10.1007/s00127-022-02389-6>.
- [31] J. Brick, R. Luyster, N.A. Fox, C.H. Zeanah, C.A. Nelson, Effects of early institutionalization on emotion processing in 12-year-old youth, *Dev. Psychopathol.* 29 (2017) 1749–1761, <https://doi.org/10.1017/S0954579417001377>.
- [32] A. Young, R.J. Luyster, N.A. Fox, C.H. Zeanah, C.A. Nelson, The effects of early institutionalization on emotional face processing: evidence for sparing via an experience-dependent mechanism, *Br. J. Dev. Psychol.* 35 (3) (2017) 439–453, <https://doi.org/10.1111/bjdp.12185>.
- [33] K.L. Andersen, V. Seliger, J. Rutenfranz, T. Nasset, Physical performance capacity of children in Norway: V. The influence of social isolation on the rate of growth in body size and composition and on the achievement in lung function and maximal aerobic power of children in a rural community, *Eur. J. Appl. Physiol. Occup. Physiol.* 45 (2–3) (1980) 155–166, <https://doi.org/10.1007/BF00421323>.
- [34] M. Brussoni, R. Gibbons, C. Gray, T. Ishikawa, E. Sandseter, A. Bienenstock, G. Chabot, P. Fuselli, S. Herrington, I. Janssen, W. Pickett, M. Power, N. Stanger, M. Sampson, M. Tremblay, What is the relationship between risky outdoor play and health in children? A systematic review, *Int. J. Environ. Res. Publ. Health* 12 (6) (2015) 6423–6454, <https://doi.org/10.3390/ijerph120606423>.
- [35] E.B.H. Sandseter, L.E.O. Kennair, Children's risky play from an evolutionary perspective: the anti-phobic effects of thrilling experiences, *Evol. Psychol.* 9 (2) (2011) 147470491100900, <https://doi.org/10.1177/147470491100900212>.
- [36] A. Jerebine, K. Fitton-Davis, N. Lander, E.L.J. Eyre, M.J. Duncan, L.M. Barnett, "Children are precious cargo; we don't let them take any risks!" Hearing from adults on safety and risk in children's active play in schools: a systematic review, *Int. J. Behav. Nutr. Phys. Activ.* 19 (111) (2022), <https://doi.org/10.1186/s12966-022-01344-7>.
- [37] H.F. Dodd, K.J. Lester, Adventurous play as a mechanism for reducing risk for childhood anxiety: a conceptual model, *Clin. Child Fam. Psychol. Rev.* 24 (1) (2021) 164–181, <https://doi.org/10.1007/s10567-020-00338-w>.
- [38] K.M. Kemple, *Let's Be Friends: Peer Competence and Social Inclusion in Early Childhood Programs*, Teachers College Press, 2004.
- [39] J.E. Terpstra, R. Tamura, Effective social interaction strategies for inclusive settings, *Early Child. Educ. J.* 35 (5) (2008) 405–411, <https://doi.org/10.1007/s10643-007-0225-0>.
- [40] L. McNamara, P. Colley, N. Franklin, School Recess, Social Connectedness and Health: A Canadian Perspective, Health Promotion International, 2015, <https://doi.org/10.1093/heapro/dav102>.
- [41] L. Talay, N. Akpinar, N. Belkayali, Barriers to playground use for children with disabilities: a case from Ankara, Turkey, *Afr. J. Agric. Res.* 5 (9) (2010) 848–855, <https://doi.org/10.5897/AJAR09.779>.
- [42] J. Ripat, P. Becker, Playground usability: what do playground users say? *Occup. Ther. Int.* 19 (3) (2012) 144–153, <https://doi.org/10.1002/oti.1331>.
- [43] M. Killen, Developing inclusive youth: how to reduce social exclusion and foster equality and equity in childhood, *Am. Educat.* 43 (3) (2019) 8. <https://eric.ed.gov/?id=EJ1231535>.
- [44] H.M. Olsen, S.D. Hudson, D. Thompson, Developing a playground injury prevention plan, *J. Sch. Nurs.* 24 (3) (2008) 131–137, <https://doi.org/10.1177/1059840532143214>.
- [45] H.S. Naeini, K. Lindqvist, H.R. Jafari, A.H. Mirlohi, K. Dalal, Playground injuries in children, *Open Access J. Sports Med.* 2 (2011) 61–68, <https://doi.org/10.2147/OAJSM.S14487>.
- [46] N. Cevher-Kalburan, A. Ivrendi, Risky play and parenting styles, *J. Child Fam. Stud.* 25 (2) (2016) 355–366, <https://doi.org/10.1007/s10826-015-0236-1>.
- [47] A. Niehues, A. Bundy, A. Broom, P. Tranter, J. Ragen, L. Engelen, Everyday uncertainties: reframing perceptions of risk in outdoor free play, *J. Adventure Educ. Outdoor Learn.* 13 (3) (2013) 223–237, <https://doi.org/10.1080/14729679.2013.798588>.
- [48] H. Rodriguez-Navarro, A. García-Monge, M.D.C. Rubio-Campos, The process of integration of newcomers at school: students and gender networking during school recess, *Int. J. Qual. Stud. Educ.* 27 (3) (2014) 349–363, <https://doi.org/10.1080/09518398.2012.762472>.
- [49] B. Tomlinson, Talking about the composing process: the limitations of retrospective accounts, *Writ. Commun.* 1 (4) (1984) 429–445, <https://doi.org/10.1177/0741088384001004003>.
- [50] K. Talari, M. Goyal, Retrospective studies – utility and caveats, *J. Roy. Coll. Phys. Edinb.* 50 (4) (2020) 398–402, <https://doi.org/10.4997/jrcpe.2020.409>.