

Article

Risk and Safety Management in Physical Education: Teachers' Perceptions

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Abstract: Bodily movement is a central component in students' educational experiences in school-based physical education (PE) programs. PE unavoidably involves physical risk. In some respects, the risk of play, sports and adventure is portrayed as necessary and healthy for children's development. However, concerns about students' safety and teachers' liability might generate risk aversion among teachers. This article explores teachers' perceptions of risk and safety management (RSM) in PE. Designed as a mixed methods study, the data include an online survey questionnaire ($n = 698$) and semi-structured interviews ($n = 17$) among primary and lower secondary PE teachers in Norway. A majority of the survey respondents report that their students only experience minor injuries in their PE classes. The interview data coincide with these results and indicate that minor injuries are rather common. While the survey results show that teachers mostly perceive RSM to be important in PE, the interview data suggest that the teachers' perceptions of risk are characterized by uncertainty, which restricts the teachers' control by means of RSM. Teachers also accept risk for enhancing students' educative experiences in PE. Consequently, this study contributes to the knowledge of the complexity of risk and teachers' perceptions of RSM in PE.



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1. Introduction

Educational experiences involving bodily movement may enhance students' development but might also be detrimental if they result in physical harm. Physical education (PE) programs in schools incorporate both the benefits and negative consequences of physical risk in various forms of physical activity. This is particularly true when the strength of PE programs might lie in teaching practices that embrace discovery and uncertainty [1].

However, some researchers claim that risk-averse policies permeate modern education [2], and that a culture of litigation has led to safety regimes that restrict children's development [3], because, with increased focus on accountability teachers might become risk averse [4].

Quennerstedt [1] furthermore suggests that

"[f]or an adult, climbing trees might be seen as full of risks and dangers, even though it is good for children to be physically active. However, for a child the same tree climbing involves other motives and reasons for climbing, for example, meaningfulness, freedom, or as a dare. So, why is it that an adult's reasons in terms of risk and the need to protect children are more valid in a discussion about climbing trees or not in an educational context?" [1]. (p. 614)

Nevertheless, there is a general agreement that students should be protected from severe harm and teachers are encouraged to facilitate adventure-based activities with moderate risk [5]. Some curricular models in PE also emphasize adventure and the benefits of challenge for students [6]. It seems imperative to investigate what teachers think about this issue but studies including teachers' perspectives on risk and safety management

(RSM) in PE programs are rather scarce, especially in comparison with early research in childhood education [7].

The literature on RSM in PE is more occupied with risk adversity and pays particular attention to teachers' liability and cases of negligent teaching [8–11]. Other RSM related literature includes recommendations for teachers that are based on identified hazards in PE [12]. Pedagogically oriented literature also touches upon RSM related themes with a focus on how teachers may teach different physical activities and sports safely such as rugby [13] or softball [14]. Plans and procedures, and safety guidelines, seem to be the ways that teachers may manage risk in PE [15–17]. Some even advocate the use of checks and controls systems to secure that PE teachers follow safety guidelines [15]. Consequently, these perspectives of RSM have implications for teachers, indicating that applying these guidelines might improve teachers' RSM and make PE safe(r) for students.

In the outdoor adventure field, a part of the planning process is regarded as a mental rehearsal that enables decisions for safety [18]. However, adaption of plans [18] and ongoing risk assessment are crucial for adventure sports coaches to retain the learning potential for participants [19]. Hence, the dynamic environments of outdoor instructors and coaches require "adaptive expertise" [20] (p. 425). While these studies from the outdoor field recognize the experts and their perspectives for generating knowledge, PE literature on RSM is top-down oriented and focuses less on the practitioners' perspectives and experiences. It is clear that risk managers face dilemmas [21] but there is a scarcity of research-based knowledge of teachers' perceptions of RSM in PE [22].

However, there are some exceptions. A Korean study suggests that elementary school PE teachers and school administrators have diverging perceptions of safety and liability [22]. There are mixed reports among PE teachers in Canada as well. While secondary teachers seem to use risk-averse strategies to secure students' safety and not necessarily due to litigation [23], safety guidelines are also appreciated by teachers due to liability concerns, particularly when teaching gymnastics [24]. A more recent Canadian study suggests that teachers are reluctant to teach gymnastics because they do not feel competent and are concerned for safety issues and liability [25]. Consequently, ambiguity and tension might characterize teachers' perceptions of RSM as they must both control and embrace risk in some respects.

A theoretical and conceptual framework of risk is drawn in the next section to discuss the results and enhance understanding of teachers' perceptions of RSM in PE in this study.

A Theoretical and Conceptual Framework of Risk

This framework draws on social theory on risk, scientific studies of language and theoretical discussions in risk research. These fields are combined in order to shed light on the complexity of risk and teachers' perceptions of RSM. Indeed, risk might unfold in various ways for actors in social life and the ways risk is understood are crucial for how people approach RSM [26–28].

Primarily, the more common concept and understanding of risk is related to adversity and loss of something valuable [29]. It might also be understood as an opportunity to gain something [30]. Albeit risk is defined in several ways the distinction between risk and danger might be useful for understanding risk and RSM [29–33] also in the context of teaching. While risk relates to human action and agency where individuals choose to take risk, dangers are associated with causes that are external and outside of control to humans [31,32]. In other words, a teacher may create risk by incorporating outdoor swimming in the teaching, yet cannot eliminate the dangerous currents in the water.

The distinction between risk-taking and risk-making [21] may be useful for exploring the meaning of generating risk in PE. When someone creates risk for their own good, they are considered to be risk-takers. Risk-making on the other hand applies to situations where the consequences adhere to someone else than the person that generates the risk.

The concept of safety is interwoven with risk because safety is conceptualized as the opposite of risk or as a state where risk is eliminated or reduced [29,30]. This connection

may be understood as a dichotomy or on a continuum: when risk is low, safety is high [30]. However, the degree of safety might be disputed due to uncertainty. When knowledge of risk is weak or unknown, the perception of safety might be diffuse or incorrect, and absolute safety might not be applicable in real life [33]. Risk uncertainty sets limitations for any actors' knowledge about the future and possible scenarios [34]. Uncertainty is a key dilemma in risk knowledge, and clearly demonstrates the limitations to certainty and RSM [34–37]. Equally, what is considered safe or safe enough might depend on the culture in question [26]. Building on this framework and the dimension of risk uncertainty, this article proposes that uncertainty might be educative [1,2] in terms of being a pedagogical approach that may foster development and learning for both teachers and students [38]. Uncertainty might be anchored in teaching pedagogies or by choice of the teacher, and not necessarily related to limitations in risk knowledge or unforeseeable events [34–37]. Opening for educative uncertainty in PE might be a choice of taking pedagogical risk to enhance students' learning.

Given the complexity of risk it is uncertain why the teacher's voice is rarely given space in the research on RSM in PE. In concordance with Young [23], gaining teachers' perspectives on risk and RSM is crucial in generating research-based knowledge for PE. The purpose of this study is to explore teachers' perceptions of RSM in PE which is operationalized in an overarching research question and two sub-research questions:

How do teachers perceive risk and safety management (RSM) in their PE teaching?

Q1 What characterizes teachers' experiences with RSM in PE?

Q2 How do teachers perceive risk in PE?

2. Materials and Methods

The concept of risk incorporates both physical and social dimensions [27] that are understood from a range of ontological and epistemological perspectives. This study is positioned within the social sciences [26–28] with the purpose to explore teachers' perceptions of RSM.

2.1. Design and Procedure

This study applied a mixed methods research approach and a convergent design [39] that included data from both a quantitative questionnaire [40] and qualitative semi-structured in-depth interviews [41]. The data generation for both sub-studies were conducted in the fall of 2019 and the results are integrated by a narrative approach in the discussion [42]. The aim behind the design was to gain insight into trends in the quantitative data and to gain rich in-depth data to generate a more elaborate and nuanced understanding.

The survey was designed as an online questionnaire through *Select Survey* which is an online survey tool designed by the researchers' university. The questionnaire was developed through multiple approaches. Relevant topics were discussed based on the aim of the survey and the researchers' experiences with RSM in PE and from PE teacher education (PETE). The international literature on RSM in PE was investigated for central topics. Former Norwegian surveys targeting PE teachers were also investigated to inform the construction of demographic items and values [43,44]. PETE educators at the researchers' university were invited to comment on the themes and items before a small-scale pilot survey was conducted with PETE educators and PE teachers ($n = 12$). Follow-up conversations typically related to validity, missing and redundant items, and the time spent completing the survey. Items and wording were further amended following interviews with teachers ($n = 17$).

The survey comprised four topics; background, experience and opinion, change and development, and practice. In the present article, four questions are analyzed and discussed. The prevalence of injuries in PE classes might contribute to increased focus on RSM and the respondents were therefore asked: *how often are students injured while you are*

teaching? (*frequency of injury*) and with values on a seven-point Likert scale from 1 (never) to 7 (always).

Along with the perceived prevalence of student injuries, how teachers experienced the severity of the injuries when they occurred was interesting to know, since this could influence how dramatically these situations were perceived by the teachers. To gain information on the severity of student injuries, the teachers were asked to categorize the students' injuries, if any, in terms of severity. The respondents were asked: *if you have had students that were injured, what were the degrees of the injuries? (degree of injury)*. The item comprised five values (from minor to critical) that were inspired by the abbreviated injury scale [45] and each value had an explanatory sub-text.

To gain more knowledge of the perceived importance of RSM the respondents were asked what they thought of RSM: *what are your thoughts about RSM in PE? (opinion of RSM)* and with five-values from 1 (of very little importance) to 5 (very important).

Teachers' implementation of the curricula might have constructed reasons for their responses to RSM. Teachers could have different perceptions of the riskiness of the activities they include in their PE teaching, and some activities might have evoked fear, unease and more attention to RSM than others. The respondents were therefore asked: *are there any physical activities or teaching methods in physical education that are riskier than others? (risky activities)*. The respondents were told in a subtext to rank the physical activities or teaching methods in terms of riskiness from 1 to 3 in three open response options.

The interviews were conducted over a five-week period in the fall of 2019. They were done in-person, audio-taped, and with an average length of 45 min, ranging from 31 to 69 minutes. Interviews were conducted by the first author with the support of an interview guide that included six predefined categories that were background, opinion, societal expectations, change and development, competence and training, and practice. The guide was designed to ask open questions and for the conversations to open avenues to other topics than those that were preplanned [46]. Interesting topics and leads from previous interviews were brought up with participants in the subsequent interviews. All of the 17 interviews were transcribed verbatim throughout the five-week interview period.

2.2. Recruitment and Participants

For both studies, e-mails were sent to school management personnel, who functioned as door-openers. The e-mails requested participants, including a cover letter with detailed information. The cover letter included information about the research, how each study would occur, what the participants would be consenting to and the potential consequences of participation. The letter contained a definition of RSM as risk and safety work with the intent to prevent and manage accidents and physical injury to students in PE.

Regarding the survey, the Norwegian Directorate for Education and Training provided the researchers with a list including 2859 Norwegian primary and lower secondary schools. Based on this list, 2572 public schools were contacted. This resulted in 949 participant teachers in primary and lower secondary education that began answering the survey ($n = 949$). Among these, 251 respondents were removed from the initial number of respondents. First, those who had not agreed to participate in the study by not checking 'finish' on the last page of the survey were removed ($n = 240$). The respondents who did not give any demographic data were also removed ($n = 11$). Within the final sample of 698 respondents, 17 missed one or two demographic item scores but were included in the analysis as they responded to the remaining questions and agreed to participate.

The respondents to the survey worked as PE teachers in primary (49%), lower secondary (34.1%) and mixed (16.6%) schools of both primary and secondary education, from all counties ($n = 18$) in Norway as of 2019. Among these respondents, 25.2% did not have any university credits from PETE, whereas 49.3% had 60 or more credits. Approximately half of the respondents (49.9%) had worked as PE teachers for 9 years or less, and among these, 117 teachers (16.8%) had two years or less of PE teaching experience. A total of

31 respondents (4.4%) had taught PE for more than 30 years. Table 1 shows the survey respondents' ages and gender.

Table 1. Respondents' ages and gender.

Gender	≤29	30–39	40–49	50–59	≥60	Total
Female	70	97	93	58	10	328
Male	71	119	98	58	18	364
Total	141	216	191	116	28	6 missing

Regarding the interview participants, a purposeful sampling strategy was applied to select participants [47] in which the main goals were to recruit teachers in both primary and lower secondary education, teachers that taught PE in the fall of 2019, to have both male and female participants, a wide range in age group and in teaching experience, and teachers that worked in both rural and urban schools. The participants were selected from three counties in proximity to the researchers' university in Norway for pragmatic reasons. Among the teachers in this study ($n = 17$) the majority of the participants were male ($m = 11$, $f = 6$), 12 (70.5%) were 40 years or older, and they worked in lower secondary ($n = 11$), primary ($n = 5$) and mixed schools ($n = 1$). All participants possessed a postgraduate degree in either generalist teacher education or specialist PE teacher education. Two teachers did not have any PETE background, whereas the remaining had PETE-related credits ranging from 15 credits to the equivalent of a bachelor's degree. All teachers had a minimum of one year of PE teaching experience, whereas 13 teachers (76.4%) had more than 10 years of teaching experience.

2.3. Analysis

The software IBM SPSS 26.0 (Armonk, NY, USA) was used to calculate frequency and percentages of the survey data. The researchers translated the questions and answers from Norwegian into English. In brevity, question (1) *frequency of injury* was reported on a seven-point Likert-type scale (never–always), (2) *degree of injury* and was reported in five values (minor–critical) (3) *opinion of RSM* was an item reported on a five-point Likert-type scale of importance (of very little importance–very important). Question (4) *risky activities* was constructed with three available open responses with the participants being asked to range the riskiest activity or teaching method first. The data related to *risky activities* were therefore categorized with Microsoft Excel by one of the researchers before the categories were crosschecked with the second researcher and thereafter quantified.

The interview analysis was a continuous process that began in the interview situation, followed by transcription of the data, coding and further analytical steps, and was finalized in the writing of results. The aim throughout the analysis was to generate results that were grounded in the data. The first author conducted the first phase of the analysis and the transcribed material was carefully read to gain an overview and then imported into the analytical software tool NVivo 12 (QSR International, Melbourne, Australia). To emphasize the participants' voices and actual wording, the data were coded by using In vivo coding in a line-by-line strategy [46,48]. The next phase of analysis included reading these codes and material to identify patterns. Based on this process, a set of focused codes that represented the core of the material was selected to generate initial categories [46,48]. The following analytical phase consisted of memo-writing, interpretation and discussion among the researchers and initial categories were crosschecked with the interview transcripts to secure that they were anchored in the data. The participants were informed of the study and of ethical information in the cover letter attached to the recruitment e-mail.

2.4. Ethical Considerations

The Norwegian Centre for Research Data (the Norwegian national Data Protection Services) gave their approval to the study before any data were collected and all participants were informed of the project's approval in the cover letter. With regards to the survey, the

respondents were again informed in the introduction to the online questionnaire of the aim of the study, its ethical implications and how they were handled as well as how their answers would be anonymous and how identities were impossible to track. Their informed consent for participation was given when they clicked 'finish', and incomplete forms were excluded from the final data material. The online survey with results were deleted after the results were downloaded to a secure and approved site.

Those who wished to participate in the interview study reached out by mail or via their local school management and the date and time were agreed upon. Of the interviews, 16 were conducted on the teachers' workplace and one was conducted at the researchers' university. Before each interview, the participants were again asked whether they participated voluntarily and were informed of the interview process. A consent form was signed if they agreed to participate. Their approval was secured to use a recorder for audio taping. In transcribing the conversations, the researcher de-identified the material by removing directly identifiable data, e.g., name; age; and sufficient additional data, such as the name of the teachers' workplace. The audio recordings were deleted after transcribing the material.

3. Results

The presentation of results from the survey and interviews is done separately in the following section. The results from the survey include teachers' reports regarding (1) the *frequency of injury*, (2) the *degree of injury*, (3) their *opinion of RSM* and (4) *risky activities*. The interview data comprise four categories included in the results: (1) *uncertainty as a characteristic of risk*, (2) *inherent risk in physical activities*, (3) *risk generated by the students* and (4) *accepting adverse consequences*.

3.1. Results from the Survey

3.1.1. Frequency of Injury

Table 2 shows that very few of the teachers (only 1.4%) perceive that students experience injuries often in their PE classes. None of the respondents report that injuries happen very often or always. On the other hand, there is also a few (3.2%) respondents that report of no injuries to students in their teaching. The results show that the vast majority of respondents perceive that injuries to students happen rarely or very rarely in their PE classes.

Table 2. Teachers' responses on how often students are injured.

Values	Frequency	Percent
Never	22	3.2
Very rarely	333	47.7
Rarely	202	28.9
Sometimes	126	18.1
Often	10	1.4
Missing	5	0.7

3.1.2. Degree of Injury

Table 3 provides an overview of the results on *degree of injury* with the values severe, very severe and critical merged to retain the respondents' anonymity. The percentage is calculated from the total number of respondents to the survey ($n = 698$). Table 3 shows that the majority of the teachers experience mostly minor injuries in PE classes, and very few experience injuries ranking as severe or critical. On the other hand, quite a few (22.6%) report moderate injuries, indicating that one of every four of these teachers might have had this experience at some point.

Table 3. Teachers' responses to the degree of injury when students have been injured.

Degree of Injury	Description	Frequency	Percent
Minor	Sprain, strain or small open wounds	630	90
Moderate	Simple bone fractures, wounds and cuts less than 10 cm	158	22.6
Severe, very severe and critical	Multiple bone fractures, unconscious more than 15 min, uncertain outcome, or death	16	2.2

3.1.3. Opinion of RSM

Table 4 gives an overview of the results on *opinion of RSM* and the teachers' reports on the perceived importance of RSM in PE. The results show that a vast majority of the respondents (86.3%) think that RSM is important or very important and rather few (4.3%) report that it is of little or very little importance.

Table 4. Teachers' responses to what they think about RSM in PE.

Values	Frequency	Percent
Of very little importance	18	2.6
Of little importance	12	1.7
Neither/nor	64	9.2
Important	388	55.6
Very important	214	30.7
Missing	2	0.3

3.1.4. Risky Activities

In the ranking of risky physical activities or teaching methods, gymnastics has the most reports (38.9%) followed by water activities (34.2%) and team sports (6.7%) in the first rank. These three comprise the majority with nearly 80 percent (79.8%) of the physical activities that teachers perceive to be riskier than others. This pattern of these three activities is repeated in the second open response and rank with 62 percent (62.3%) of the responses. In rank three are, firstly, team sports (25%), followed by winter activities (13.4%) and outdoor education (13.4%). There are only seven reports of teaching methods in total and include inductive teaching and student-led activities. Figure 1 illustrates the teachers' responses to *risky activities*.

3.2. Results from the Interviews

The interview results comprise the four categories: (1) uncertainty as a characteristic of risk, (2) inherent risk in physical activities, (3) risk generated by the students and (4) accepting adverse consequences. The citations from the interview raw data are selected because they are representative of the four categories. The codes (e.g., IP16) are generated by the Interviewee Person and a number.

3.2.1. Uncertainty as a Characteristic of Risk

Teachers in this study claim that the risk of accidents and injuries to students relates to the inherent traits of the PE program. In talking of risk in PE, the reference is other school programs in which the physical risk in PE is perceived to be higher.

"Especially compared to other school programs, it is the program that is most prone to injuries. It happens relatively often that we have minor injuries—little things and such". (IP16)

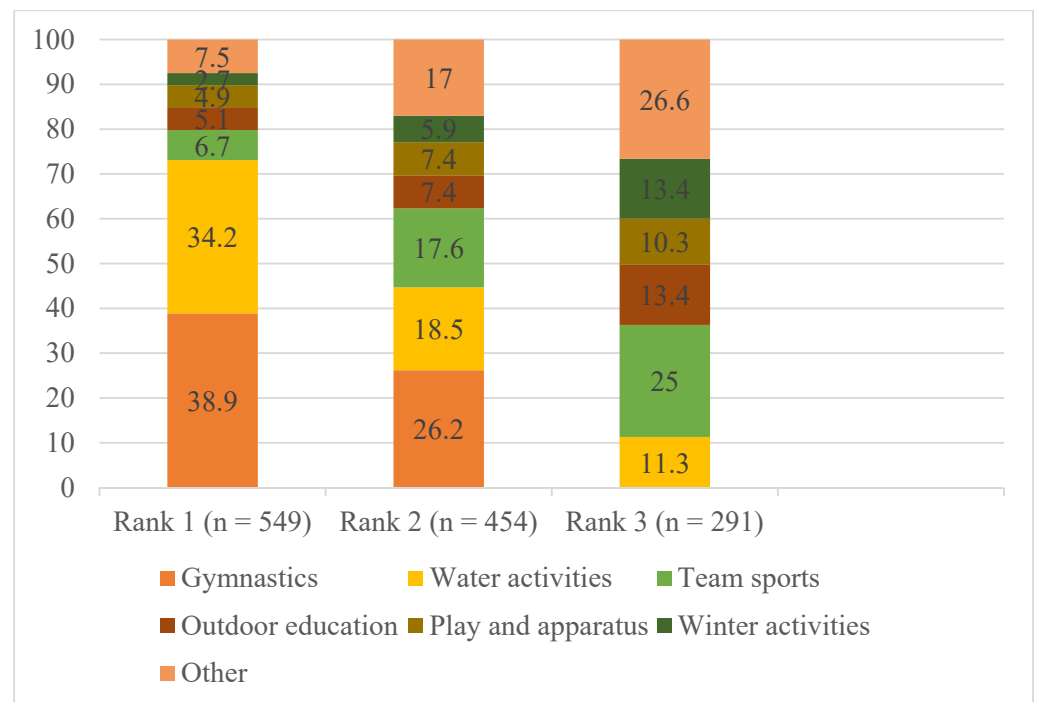


Figure 1. Teachers' ranking of risky activities/teaching methods; percentage within rank.

However, the teachers still do not seem to consider PE as incurring a great risk, and some even claim they do not pay attention to RSM in their teaching. The teachers' experiences of risk are characterized by the dichotomy of being or not being in control. The teachers' lack of control generates an uncomfortable feeling and is clearly a worry in some respects, and a participant claims that:

"if we bring students outside, I am not in control. It means, I have control of my students, but I am still not in control. It is just the way it feels, the nature of things . . . I believe it is a natural element in the subject, but as I think of it, it is a source of concern that is always present". (IP6)

This feeling of not being in control might relate to how the teachers interpret/enact the curricula, and contextual barriers might create a dilemma for teachers because a lack of supervision might induce both risk and stress. One participant explains that:

"[s]ome of the problem with organizing physical activities is that we are alone. Often I need to split them in groups and do activities in two halls, for example, and I cannot be in two places at the same time. Still, I choose to organize the activity in a way that makes PE fun, and I want to take advantage of the space, so there is always a risk that something can happen in the other part of the hall. [. . .] I have experienced it before; it is a bit creepy that you are not present right when it happens". (IP16)

The participants experience control when they are present and close to the students; however, when the teachers attempt to be in control, other unforeseen situations might arise. These include a combination or diversity of incidents, mishaps, other causes or outcomes. An impression among the participants is the limitations of RSM due to unpredictable events because:

"[y]ou can never be a hundred percent assured, but it must mean something, but I believe it is hard, because it happens so fast. It may happen at any time. [. . .] You may plan for this to happen and then something else happens. You are afraid that [the students] will fall outside the mattress when [they] are conducting a high jump, but in the take-off the knee fails. So that is something you cannot plan or do something about". (IP17)

Adding to their perception of uncertainty, the teachers seem to associate certain physical activities with higher risk.

3.2.2. Inherent Risk in Physical Activities

Although games and play are unpredictable, the teachers describe certain physical activities such as climbing, water activities, strength exercises, contact sports and outdoor education as likely to incur risk, and some as even likely to cause severe injury to students. These activities are described as dangerous, evoking a feeling of insecurity and a lack of control. Gymnastics has a clear and prominent position as the physical activity that concerns the teachers the most due to the movements involved. Teachers describe the use of gymnastics equipment such as trampolines or vaults as unsafe and requires extra caution. Teachers also question their competence in teaching gymnastics and a participant argues that:

“[i]t might be due to me not being [competent] enough, that I am unknowledgeable of, in relation to the trampoline and up in the air I imagine that a lot of things may happen. I do not have complete control of how they come down”. (IP9)

There is however a controversy relating to teachers’ perceptions of gymnastics and the use of trampolines, as their perceptions do not necessarily relate to their own teaching experiences in which these activities have led to accidents and injuries to students. As this following excerpt indicates, there might be other reasons for the teachers’ associations of gymnastics as unsafe.

“It might be dangerous if you are not there, watching. We got a trampoline a few years ago. I do not use it when I am alone. Because you tell the students to take it easy, but they do not”. (IP2)

“Have there been any accidents?” (Researcher)

“Not any accidents, no, but we are cautious when using it”. (IP2)

Hence, how the students act during PE raises concerns in addition to the physical activities taught.

3.2.3. Risk Generated by the Students

The combination of physical activity and students’ characteristics, such as playing soccer with varied degrees of competence among the students, strengthen the potential for accidents in PE. This aspect, according to the interviewees, relates to situations in which the teachers are not in complete control of the students’ actions. Teachers seem to associate two student groupings with risk in PE programs. In describing the first group, teachers position them against a frame of reference in which they compare them to students from ‘before’. First of all, this group of students lack bodily learning experience and they:

“are not used to moving as much and then the risk of injury is greater, and I must take that into consideration when I set them into motion”. (IP10)

The teachers characterize the students as lacking in motor skills and body control, having limited experience with physical activity and being unfit. The teachers do not consider the more physically active students to be at risk because these students know how to avoid potential risk situations. The second grouping of students that generate risk contrasts with the first group of unfit students due to their roughness. Teachers describe them as wild and competitive and say that some of them break the rules to win and generate risk for the other students. Participants claim that rough boys are especially challenging in relation to girls as there are situations in which girls are run over in class and:

“some are violent and become violent towards others, and that is scary for someone, especially due to the difference between boys and girls, because the boys are a lot stronger than the girls”. (IP11)

Nonetheless, the teachers wish to make use of the available space and so students can have fun, and teachers therefore accept risk in their PE teaching.

3.2.4. Accepting Adverse Consequences

One of the themes that participants mention during the interview is that minor accidents occur in PE and are under the impression that less severe injuries to students are somewhat normal because:

“[w]e must accept all the injuries that happen within the framework of safe operation, but if we rock climb without a safeguard and somebody falls from four meters, I have not done my job. But in soccer, injuries may happen; in handball, injuries may happen; in basketball, you might get struck by a ball. You must account for that; injuries may happen and [you may] break your nose”. (IP10)

Although teachers talk about safety in relation to dangerous physical activities, safety is less a topic among the teachers in relation to those activities in which minor incidents and injuries are more common. Teachers argue that this risk experience is part of the students’ learning process and:

“[a]ccidental mishaps—you just have to accept collisions, a ball in the nose and such things, and I believe it has something to do with the development of youths. You participate and that may lead to something, but most often it is things that you can tolerate. I think it is healthy for their development”. (IP11)

Asking teachers about unacceptable risk in PE, the responses are made with reference to the degree or the severity of injuries and in particular neck and permanent damages to students. There are indications that injury severity and not necessarily the frequency of injuries, if they are minor, is the reference or limit for teachers’ risk acceptance because:

“[y]ou might get a stiff neck for the rest of your life or be paralyzed. That is the great fear—those are the things you are really afraid of—to be responsible for a students’ paralysis. A broken leg is of course difficult, but you can live with those things”. (IP16)

Yet, multiple considerations in PE put the participants in a dilemma where they have to accept risk.

4. Discussion

The results from the survey and interviews are integrated in the following to discuss teachers’ perceptions of RSM in PE.

Concerning teachers’ experiences, the results suggest that balancing risk and safety concerns within the educational mandate of PE is complex. Teachers are responsible for students’ safety and it might be tough for teachers to experience injuries to students. The survey results show that 90% of the respondents report of experiences with minor injuries to students and that only 3.2% claim to have never experienced any injuries to their students. Based on these results minor injuries are rather common in primary and lower secondary Norwegian PE classes. The survey respondents do also report, to a great extent, that RSM is important in PE. This coincides with reports from teachers in a Canadian study [23]. The interviews with teachers might provide some nuances to these results because there are diverging perceptions of RSM among the participants, and that some teachers may not pay particular attention to RSM in PE. If minor injuries that happen are acceptable to teachers, the prevalence of many minor injuries might be a result of not thinking that RSM is important. Another explanation might be that RSM is not a pedagogical or common or explicit theme among teachers and in the teachers’ institutional environment [26]. Then again, only 4.3% of the survey respondents think that RSM is of very little or little importance.

The potential for more adverse risk [29] and critical injuries in PE might offer further understanding, and of teachers’ opinions of RSM. Severe injuries do mark a line in the interviews and are not acceptable to teachers in the way that minor injuries are. Although the survey results indicate that severe injuries are very rare, the teachers may dread severe to critical injuries. Consequently, injury prevalence might be less important than the risk severity potential, as severe and critical injuries may occur in PE. Alternatively, cases of

negligence and litigation have received attention in literature on RSM in PE; in particular USA [8–11]. Under these circumstances, fear of litigation might permeate the teachers' perceptions of RSM in PE. However, the teachers in the interview study do not seem compelled to impose conditions of absolute safety [30,33] as might be expected from risk aversion [2–4]. The results in Young's [23] Canadian study also question PE teachers' preoccupation with and fear of litigation.

This study also connects teachers' perceptions of RSM in PE to the ways the teachers interpret/enact the curricula. Looking at teachers' perception of risk and the physical activities that are taught, the interview participants are conscious of the potential for adversity but also of the benefits of risk [29,30] in, for example, gymnastics. Albeit the results from the survey show some dispersion in what is perceived as risky activities in PE (see Figure 1), gymnastics, water activities and team sports comprise the main body (79.8%) of those ranked first. Canadian teachers are also reluctant to teach gymnastics [23,25]. Given teachers' focus on certain activities, they might be in a sound position to target the risk that is unique for PE. However, as teaching methods are only reported on seven accounts, it might be an indication that teachers perceive risk as an inherent element of physical activities and not necessarily how PE is taught. Consequently, it might illuminate issues with teachers' risk perception or risk discourse in PE, as risks that are hidden or not included in what the teachers perceive as risky might be disregarded.

The distinction between risk and danger [31,32] might be useful to understand how teachers sometimes might generate and control risk in connection with their decisions and action. Danger, represents the risk that might be present in the program despite of teachers' choices. In the case that some students might actively engage in risk-taking to experience the benefits, other students might be exposed to danger from the same risk. The results indicate that teachers do not necessarily perceive risk agency with regards to the roughness with which some students behave in PE classes. If teachers connect students' roughness to danger [31,32], teachers might be left with less perceived control. Otherwise, if teachers accept roughness in terms of educational risk [1,2,38] it might still create victims in this environment. Whereas boys acting rough might generate risk for themselves, the girls in PE might experience danger in this respect. A critical point is whether teachers' pedagogy in PE programs generates what might be dangers for some students.

The results suggest that there are conflicting considerations between educational risk for students' benefit and potential adverse risk which places the participants in a dilemma. In situations where pedagogical concerns triumph, teachers seem to emphasize the benefits of experience, fun and taking advantage of space. Thus, creating spaces for educative risk-taking [21] on the students' behalf might be a necessary step for teachers to secure students' learning in PE. Teaching pedagogies that embrace uncertainty [1] might function to explain and justify why minor injuries are common in PE. Possibly, a dichotomy exists between students' safety and learning, and teachers might justify risk through the mandate and educational potential of uncertainty [1,2,38]. The results in this study indicate that safety is challenged by teaching pedagogies that require some degree of risk acceptance by teachers. Hence, it might be that teachers' risk acceptance, or aversion in some respects, are social responses to risk in PE programs [26].

An alternative understanding to the pedagogical reasons for uncertainty [38] is risk uncertainty. Because uncertainty might be an inherent trait to risk that is not necessarily reducible due to randomness or chance [34,37]. The teachers talk about not being in control and their descriptions of insecurity and unease characterize some of their experience in PE. On the other hand, it might also relate to teachers' lack of risk knowledge. Nevertheless, risk uncertainty generates additional complexity to RSM and boundaries for teachers to take control of the unforeseen by means of RSM. Research from the outdoor adventure field might provide some support to PE teachers because dynamic environments require "adaptive expertise" [20], flexible plans [18] and ongoing judgement [19], which might be equally relevant for PE teachers as for the outdoor leaders. Albeit uncertainty in teaching is not something new [38], the fundamental uncertainty in risk [34,37] does not seem

to have gained attention in research targeting RSM in PE. Consequently, absolute safety might be impossible to realize in practice [33] and demonstrates the limitations to RSM that teachers touch upon in the interviews. A possible conflict in this environment is the deviation from other fields and the external expectations for students' safety in PE. If risk in PE is perceived to be manageable by stakeholders, and uncertainty only a question of gaining knowledge, and not chance, risk reduction or even elimination would be possible through implementing certain proactive means [15]. If zero harm is the norm established by regulation or policy, teachers need to gain control of all risk in PE to guarantee that students will incur no injuries. Such a situation might not even be possible considering the results offered here. A pertinent question is how teachers can communicate to stakeholders the ways that risk unfolds in PE to gain acceptance regarding the uncertainty.

There are limitations to this study and the survey's statistical data must be read with caution. The population of PE teachers in Norway is unknown and the sample is not randomized. However, the sample is fairly large in a Norwegian context, includes respondents from all counties, and might comprise a group of respondents that can better answer the topic under investigation. The survey results are limited to teachers' interpretations and self-reported assessments, and several biases might exist in the data. The interview data clearly depends on the conversations between the participants and the first author. There are multiple avenues for future research to address these limitations and a potential to build on the results presented here. First, group comparisons and inferential statistics might suggest how teachers' ages, sex, years of PE teaching experience and PETE background might associate with teachers' perceptions of RSM. Given that uncertainty is a characteristic of risk in PE, ways of coping and communicating uncertainty is a prudent avenue for investigations through prolonged engagement. Moreover, if teachers perceive a lack of agency in relation to the rough behavior of students, support for teachers is essential for achieving agency in this respect. Therefore, exploring teachers' RSM knowledge and the ways teachers' perceptions of RSM influence their RSM practices are vital as it may ultimately have an effect on students' education in PE programs. How students perceive risk and RSM in PE is still an avenue for further research.

5. Conclusions

This article explores teachers' perceptions of RSM in PE. Primarily, the survey respondents report that RSM is important in PE even though the results of the survey indicate that the teachers rarely experience their students' having severe injuries. The majority of the survey respondents on the other hand report of experiencing minor injuries to students in their PE teaching. The perception of not being in control is also voiced regarding risk in PE. The results suggest that teachers perceive some physical activities and equipment as inherently risky, some as even dangerous. In some respects, teachers might perceive that risk aversion might restrict the educational purposes of the PE program. The interview material suggests that risk acceptance is the norm and this thinking might be common. A possible explanation for teachers' risk acceptance might be found in educational pedagogy. However, in this environment, accidents happen that might have detrimental consequences for students. Uncertain risk might still restrict teachers' control and absolute safety might not be applicable to PE.

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