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Measuring Self-efficacy, Prerequisites to participate and Functioning in Students with and without Impairments

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Measuring Self-efficacy, Prerequisites to participate and Functioning in Students with and without Impairments

Including vulnerable groups of students such as students with learning disabilities in mainstream school research, require ethical considerations and adapting questionnaires to make these accessible. As a consequence these students are excluded, not studied as a separate group, or give inadequate replies. This pilot study aims at developing and evaluating student self-reported measures, rating aspects of student experiences of school-based Physical Education (PE). Instrument design, reliability and validity were examined in 47 Swedish secondary school students, aged 13, with and without impairment and test-retested on 28 of these students. Psychometric results were confirmed in analyses based on replies from the first wave of data collection in the main study (n=451). Results show adequate internal consistency, factor structure and relations between measures. In conclusion, reliability and validity were satisfactory in scales to measure self-efficacy in general, in PE, and prerequisites for participation. Adapting proxy ratings for functioning into self-reports indicated problems, and were adjusted. Adequacy of adjustments made were confirmed and suggested adaptations are outlined.

Keywords: self-efficacy, functioning, physical education, disability

Introduction

Physical activities and a healthy life-style are fundamental to people's well-being (The Swedish National Agency for Education 2011a). Sense of self and identity in Physical Education (PE) among vulnerable groups of students such as those in need of special support is an aspect of student experiences, which is not well researched (Fitzgerald 2006, Haegele and Hodge 2016). Students with learning disabilities are often excluded from research concerning student perceptions and self-ratings (Alderson and Morrow 2011). Including these students into studies require adapting and testing the self-rating instruments. Validity and reliability in instruments for measuring perceptions of self-efficacy, prerequisites for participation in PE and functional skills have been investigated in a pilot study.

In the main longitudinal study, for which the instruments were evaluated in the pilot study, the results of 451 students in Swedish secondary schools, ages 13-16, are compared in three groups, students with diagnosed disability, students with low grades, and high achieving students. As participants in both the disability and the low-grade group may have difficulties responding to self-rating questionnaires, this pilot study intends to investigate how students manage questionnaire procedures and understand contents of the survey. Previous research has demonstrated that children with cognitive difficulties can respond reliably to self-ratings if procedures and questionnaires are adapted (Arvidsson et al. 2012, Nilsson and Renning 2012).

Self-efficacy

Self-efficacy is defined as an individual's expectation of successful future performance of specific tasks (Gutman and Schoon 2013, Pajares 1996). Global self-efficacy refers to a general sense of competence and academic self-efficacy is tied to specific tasks and

domains in school subjects. Ratings of subject specific self-efficacy is more accurate and a better predictor for future achievement and grades within the specific subject than ratings of general self-efficacy (Schunk and Pajares 2010b, Valentine, DuBois, and Cooper 2004, Schunk and Pajares 2010a). The focus of measuring academic self-efficacy is common in intellectual topics such as reading, writing and calculation skills (Bandura 1994). Having less academic focus, a practical school subjects such as PE provides an opportunity to succeed in school independent of academic preference or need of special support. Practical and aesthetic school subjects create opportunities to participate in pro-social activities (Feldman and Matjasko 2005), which promote functions such as self-efficacy and task persistence (Gutman and Schoon 2013). These are important functions since they have the potential of positively affecting academic outcome (Duckworth and Seligman 2005, Lipnevich and Roberts 2012), peer relations and identity (Guay, Marsh, and Boivin 2003) life-situation (Marsh and Martin 2011), future health (Marsh, Papaioannou, and Theodorakis 2006), and the labor market (Lindqvist and Vestman 2011, Tangney, Baumeister, and Boone 2004, Heckman, Stixrud, and Urzua 2006). Thus, self-efficacy in PE is especially important for children with impairments or low grades.

Students' who believe that they can accomplish a task are more likely to master new experiences and gain high self-efficacy. Bandura (1986) argued that our expectations of outcome determine the effort we invest. Experienced mastery and previous success of others, affect our expectations of successfully completing a task. Consequently high self-efficacy is an example of a positive school outcome, which indirectly affects future school performance, achievement and grades for children with typical functioning (Gustafsson et al. 2010).

Physical Education and Self-efficacy

PE is generally a popular school subject, nevertheless it is a subject where more absenteeism is seen for students with impairments (Sport England 2011, The Swedish Schools Inspectorate 2011). Students in need of special support report non-inclusive lesson content, physical exposure and bullying as reasons for participation restrictions and lack of inclusion in PE (Falkmer 2012, Smith and Green 2004, Patrick, Ryan, and Kaplan 2007, Upadaya and Salmela-Aro 2013, Goodwin and Watkinson 2000, Coates and Vickerman 2010, Bebetos et al. 2013). In a PE context previous research shows significant relations between perceived competence and a range of physical self-concepts (Cox et al. 2011, Ntoumanis et al. 2004). Curricular PE can offer unique opportunities of participatory gains, since physical activity on a regular basis is provided all students (The Swedish National Agency for Education 2011a). However, results in a recent Norwegian study imply that curricular PE favour students involved in extracurricular sports, which may contribute to inequity in health behaviour. Further research is suggested to study and test this implication by including concepts such as ability, mastery and competence (Säfvenbom, Haugen, and Bulie 2014). When studying student characteristics of children with impairments, type and level of impairment is primarily investigated as aspects of participation facilitation/restriction (Block and Obrušnikova 2007) while other personal factors such as self-efficacy is less researched. Students' perceived self-efficacy beliefs in PE and in relation to grades in PE for students with and without impairments need to be investigated.

Rationale for Aspects to Measure

The less academic focus of PE might lead to a stronger relation between general self-efficacy and achievement in PE, than between general self-efficacy and achievement in specific academic school subjects. To test this hypothesis measures of both general self-

efficacy and PE specific self-efficacy need to be used. In this pilot study an instrument aimed at measuring general self-efficacy, *The Self-Efficacy Questionnaire for Children* (SEQ-C) (Muris 2001) was translated and validated in a Swedish context.

An instrument for specific self-efficacy in PE, related to the intended learning outcomes was developed in accordance with Bandura's (1986) guidelines about accuracy when measuring specific self-efficacy and guidance of how to develop self-efficacy scales (Pajares and Urdan 2006). The school subject PE is part of the compulsory school curriculum in Sweden. Compulsory school in Sweden is nine years and regulated by the educational act and the national curriculum. Grades in all school subject syllabi are goal-referenced, on a scale A – F, where A-E are passing grades and F means fail. In the Swedish syllabus of Physical Education and Health (PEH), the knowledge requirements used for grading are grouped into three areas of core content; movement, health and life-style, and outdoor life and activities (The Swedish National Agency for Education 2011b). To investigate specific self-efficacy beliefs in PE, the three core content areas were operationalized into a self-reported scale of perceived self-efficacy in activities commonly enacted in PE. By linking these activities to the syllabus, a unique opportunity to compare student self-efficacy beliefs with teachers' grading of students was created in the scale *Self-efficacy in PEH* (SE-PEH).

Participation and self-efficacy are strongly related in children with complex communication needs (Clarke et al. 2011). Self-efficacy beliefs include emotional, physical, mental and social skills achieved by practice and interaction and the will to invest effort in engaging in the activity (Bandura 1994). School achievement and self-efficacy are promoted in conditions where the students perceive that they can influence and are in control of their learning process, self-regulation and self-evaluation (Harlen and Deakin Crick 2003). These conditions also promote participation, which is defined as

‘involvement in a life situation’ in the International Classification of Functioning, Disability and Health, Children and Youth version, ICF-CY (World Health Organisation 2007). Students with functional problems who report high participation also report high autonomy (Eriksson, Welander, and Granlund 2007) and autonomous behavior can be predicted by measuring self-efficacy (Caroli and Sagone 2014). The developed measure, *Prerequisites for participation* (PrePart) needs to be evaluated.

Most studies of school functioning involving children with impairments include measures of type and degree of impairment primarily in which proxy raters, i.e. parents or professionals rate the child’s impairments (Fitzgerald 2006, World Health Organisation 2007). The PE context involves interaction, and visual, audial, and kinesthetic perceptions, which are situation-based and difficult to predict. Assistants are not always present at PE-lessons, we could not assume that the teachers knew all abilities of all students and adding information from parents might decrease response rates. Therefore, a decision was made to develop and implement and evaluate a student self-rating scale of functional skills.

Aim

The aim of this study is to investigate psychometric properties, reliability and validity of self-efficacy, prerequisites for participation and self-ratings of degree of impairment to be used with children aged 13-16 in mainstream compulsory school in Sweden by:

- (1) Describing the development of instruments
- (2) Analyzing internal consistency and reliability of adapted and developed scales to be used by both students with and without impairment.
- (3) Measuring stability in student responses over time, i.e. test-retest on scales and items

- (4) Investigating construct validity of the scales measuring self-efficacy, prerequisites for participation, and functioning
- (5) Confirming psychometric properties on a larger sample

Methods

Participants

A total of 47 students, 25 boys and 22 girls in year seven participated in the pilot study validating content. Gender was reported and coded. Grades from year six were reported by students who remembered and wanted to record their grade. No identities can be tracked down from the data collection. Students were recruited from two mainstream classes and to guarantee including participants in need of special support, from one special school class for students with intellectual disabilities. Five students with mild intellectual disability, eight students with low grades, twelve students with high grades in PE and 22 classmates were included in a first test of psychometric properties. A retest was performed in the pilot study mainstream classes two weeks later. Students from the main study, not involved in the validation, were used to further confirm psychometric properties. Informed consent was collected from the 121 of 451 students (and their parents) who agreed to participate. These students represent three groups, students with diagnosed disability (n=30), students with low grades, D-F (n=36), and students with high grades, A-C, in PE year 6 (n=55). Their 335 classmates participate as a group of others, and are treated as a non-identifiable reference group in the total sample.

Instruments

The Self-Efficacy Questionnaire for Children (SEQ-C)

The SEQ-C is a scale consisting of 24 items on a five-range scale measuring perceived general self-efficacy (see table 1). Three subscales of self-efficacy are covered by eight items each, academic (e.g. *how well do you succeed in passing a test?*), social (e.g. *how well do you succeed in staying friends with other children?*) and emotional self-efficacy

(e.g. *how well can you prevent to become nervous?*). The SEQ-C scale has been validated (Muris 2001), showing internal consistency of α .88 (N=330, age mean 15.3). Validity of using three subscale factors account for 53.3% of the variance (eigenvalues: 7.2, 3.3 and 2.3) with alphas between .85 - .88.

Self-efficacy in PEH (SE-PEH)

In order to measure Swedish knowledge requirements based on the goal-referenced syllabus of PEH (The Swedish National Agency for Education 2011b), the 20 item SE-PEH scale instrument was constructed. The knowledge requirements were grouped into three subscales corresponding to the core content of PEH: movement (MovementSE), health and life-style (HealthSE) and outdoor life and activities (OutdoorSE). Perceived self-efficacy within the MovementSE subscale includes activities such as dance, games, athletics obstacle courses, gymnastics, team sports and swimming. HealthSE contains perceived knowledge and skills of physical activities (aim, organization, experiences and effects), injuries, risks and handling emergencies. In the subscale of OutdoorSE occurring activities to be recorded are outdoor life, handling aquatic emergencies and orienteering (see appendix). A six step Likert scale, compatible with the A-F grading scale was used for students to rate their perception of ability (1=not good at all – 6=very good).

Prerequisites for Participation (PrePart)

According to previous research on the grading of PEH, motivational aspects for students to participate and perform in PEH include perception of knowledge requirements, teacher support and physical competence (The Swedish Schools Inspectorate 2011). A seven item scale measuring prerequisites to participate in PEH was constructed, rating 1=null agreement to 6=full agreement (eg. *I perceive that my teacher encourages and supports*

me). Engagement in PEH, such as perceptions of being able-bodied, accommodated for and secure are based on previous research on prerequisites for participation (Maxwell, Alves, and Granlund 2012).

The Abilities Index (AI)

Many previous studies have related type and degree of impairment to perceptions of inclusion and achievement in PE for students with impairment (Block and Rizzo 1995, Morley et al. 2005, Block and Obrusnikova 2007). Impairment has primarily been classified by professionals or parents (Fitzgerald 2006, World Health Organisation 2007). In this pilot study a Swedish version of the Abilities Index (Roll-Pettersson 2001) was used to develop a tool for students' self-ratings of functioning. The 17 items measured functioning across nine major areas on a six-range scale, 1=typical function to 6=atypical function. The instrument addresses type and degree of physical and cognitive impairments; vision, hearing, motor control, problem-solving, behavioral and social skills, communication, and health aspects. The original scale is used for professionals' proxy ratings of body functions and activity performance in children with disabilities. Previous investigations of validity and reliability of the AI in North America and Sweden have concluded the index to be useful as a measure of functional impairments (Bailey et al. 1993, Bailey et al. 1995, Roll-Pettersson 2001). In the planned study the AI will be used as a student self-rating scale in a population where most students have typical functional skills, and therefore needs to be analyzed.

Table 1. *Descriptives of scales evaluated in the pilot study.*

Procedure/Data Collection

In a first phase, SEQ-C was translated following the steps of the Brislin model of translation, back translation by bilingual translators and revision, in a circular mode, until finding a translation adapted to a language used and understood by adolescents without changing the meaning (Brislin 1976). SE-PEH was developed in collaboration with experienced, professional PEH teachers by interpreting the PEH syllabus and creating items based on common content of PEH-lessons. Comments from the ethical board about difficulties in rating items resulted in initiating the SE-PEH scale with *Report how you perceive your skills and abilities to...e.g. master obstacle courses* (see appendix). PrePart was created considering previous participation and grading research. The AI was critically screened by a professional teaching the targeted age group. By estimating students' understanding and potentiality to successfully self-report, the AI was subjected to major revision. Suggested changes were controlled and approved by the developers of the AI (Simeonsson and Bailey 1991).

In the second phase students were recruited from a local school, comprising a choice of convenience. Students from three year-seven classes completed the questionnaire, two from a mainstream school and one from a special school for students with intellectual disabilities. Students in the mainstream school read and reported questions themselves, researcher assisted, making notes of questions asked. The special class was assisted by teachers, reading the questions aloud and assisting in reporting when needed. Both PE facilities and ordinary classrooms were used when completing the questionnaire.

Statistical Analysis

Instrument design, internal consistency and construct validity were examined in the pilot study following the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist manual, i.e. standards for high methodological quality to ensure appropriate conclusions about the measurement properties (Mokkink et al. 2010).

Exploratory factor analysis was conducted using Principal Component Analysis, to confirm or discover underlying constructs between variables in the scales. Direct oblimin rotation was chosen to find the most variation in factor structures. Mean scores were calculated for all total and subscales. Reliability was tested by using Cronbach's alpha to evaluate internal consistency and two-week test-retest stability. Spearman's *rho* was used to test stability of scores and assess item consistency. Content validity was performed by asking experts in various educational fields and students, their judgement of words and phrasing (not tested statistically). Construct validity was tested for in all the total scales and subscales. The total scales of self-efficacy, general and in PE, were tested for convergent validity and all total and subscales for divergent validity. Findings from the psychometric analyses were tested by repeating the analyses with data from the first wave of the main longitudinal study. Cases with more than 25% missing values were therefore excluded. Pairwise exclusion of cases was used in the retest, rendering in 28 valid informants.

Ethical Considerations

Ethical considerations such as informed consent, confidentiality and voluntary participation were given as well as information of purpose. All questionnaires were coded and stripped from background information immediately after data collection. The main study has been approved by the Ethical Review Board, Linköping (2013/508-31).

Results

A skewness in distribution was detected, most students reported high self-efficacy, in general and in PEH, experienced good prerequisites to participate, and reported typical functioning (see table 1). Analysis of internal consistency and factor structure was based on replies from 47 students. Test-retest correlation on item and scale level was carried out on 28 individuals. The AI scale is reported in separate section.

Factor Structure

The findings of a three-factor solution in SEQ-C (Muris 2001), excluding items with low loadings ($<.40$), was not detected in the pilot study, but later confirmed in the main study, (see table 2).

Table 2 *Component analysis of total scales.*

In a theoretically desired solution of three factors in SE-PEH, excluding three variables of loadings $<.40$ (items 18, 19, 20, see appendix), convincing loadings were found in the pilot study of two of the subscales. A third factor contained non-competitive activities (items 1, 2, 8, 15, 17) from all three subscales. Further analysis of data from the main study indicate factors of the three subscales HealthSE, OutdoorSE and MovementSE. Self-efficacy in dance and fitness programs (items 1 and 2 in MovementSE) made out a forth factor.

Reliability and Validity of SEQ-C, SE-PEH and PrePart

Internal Consistency

Cronbach's alpha-values were found satisfactory or acceptable in all scales but one in the pilot study, the subscale OutdoorSE in SE-PEH (see table 3). Satisfactory or acceptable values of all scales were found in the main study.

Table 3. *Internal consistency of scales used and tested in the pilot test.*

Test-retest Reliability

Table 4. *Test-retest scores were estimated using Spearman's rho.*

There are strong linear associations in total scales (see table 4) indicating stability in ratings. Examining item correlations revealed weakly correlated items, two each in the SEQ-C and SE-PEH (items 8 and 11) scales, and one in PrePart.

Reliability and Validity of the AI

Low variance, high attrition, and a large amount of missing values among students with typical function was found in the AI. Inspection of scale variance and Cronbach's alpha if item deleted indicated that body function variables were too detailed to be relevant.

The indication was confirmed by insufficient stability over time and further by investigating factor structure. Initially factor structure was not possible to detect.

Combining two variables of functioning in for example left and right eye into one about vision, implied in what direction revision need be taken to assure relevance for students without impairment. All the variables of body functions; hearing, vision, hands, arms, and legs, were combined into one resulting in $r_s = .62$ $p < .01$. The use of component analysis concluded in a two-factor solution, despite a weak KMO of .53, explained 56% of the variance. This was used as an indication of relevant factors and ways to revise the scale into one factor of physical function and one of psychosocial functioning, which were confirmed in the main study.

Comparing Scales

Results support that total scales regarding self-efficacy, prerequisites for participation and functioning are related to each other (see table 5). Moderate significant correlations were found in the pilot study between general self-efficacy, specific PE self-efficacy, and functioning. Prerequisites for participation correlated strongly with specific PE self-efficacy, and weakly with the other total scales. SEQ-C and PrePart, did not show a significant correlation in the pilot study, but significance was seen in the main study. In the main study, the correlations are significantly stronger, except for between SE-PEH and functioning. The scales also show lower means, larger distribution except for in SEQ-C. Skewness in PrePart and AI needs consideration in future analysis (see table 1).

Table 5 *Correlations between self-efficacy, prerequisites for participation and functioning*

Students Identified as in Need of Special Support.

Validating the decision to identify three different groups, these groups diverge in relevant scales. To stay on task, i.e. complete the questionnaire, classrooms were preferable to PE facilities. After the 15-20 min questionnaire students could continue with ordinary schoolwork, whereas focus shifted in PE facilities, when students moved on to more physical activities. Opinions from students and teachers about wording and comprehension expressed a demand for further modification of difficult words and concepts, and items of the SE-PEH and PrePart scale required to be clarified by examples. Higher levels of missing values were found in two scales, SEQ-C and SE-PEH. Scale means, therefore include the five students with diagnosed intellectual disabilities responding to at least 70% of items. In SE-PEH six items, were missing for all these students (items 1, 2, 10, 11, 13, 18, see appendix). These results indicate that

operationalization has not been properly adapted to this group and were discussed with specialist professionals.

Presented results were based on analyses carried out including a limited number of students in need of special support in the pilot study (see table 6). Despite small samples there are indications that these three groups are differentiated, not only by grade but also by factors such as self-efficacy, prerequisites for participation and functional skills. Scale means are lower for students with disabilities compared to the other groups. Students with low grades in PEH, reported higher means than students in need of special support, but lower than students with high grades in PEH. Students with high grades display highest means and lowest distribution. This was also confirmed in the first wave of the main study, represented by 121 students in the three groups. Distribution is larger for the students with disabilities in the pilot study in all scales. Compared to students with low grades in the main study, distribution is lower in two scales, SEQ-C and AI.

Table 6 *Differences between students in need of special support, low grades and high grades regarding self-efficacy, prerequisites for participation and functional skills.*

Missing Values

Patterns of missing values were found in SEQ-C and SE-PEH for students with intellectual disabilities. Including a special school in the pilot study was partly to guarantee the representation of students in need of special support, and partly to gain insight of how to modify the questionnaire to guarantee accessibility to student with learning difficulties. For the main study purpose of investigating self-efficacy in students attending mainstream schools, it was reasonable to assume only students with mild intellectual disabilities to be included in such settings. It was therefore decided to exclude

questionnaires with most missing values (7/12) from the special school. Patterns of missing values were also found in the AI for students of typical function.

Discussion

Physical Education in school offers the opportunity for all students to be physically active, gain knowledge and learn skills for life. Interventions aimed at increasing physical activity among students in need of special support conclude that the students who gain most are those who have severe motor skill restrictions (Ericsson 2011) or are minimally physically active in their leisure time (Prochaska 2003). Investigations of student characteristics in students in need of special support primarily focus on type and degree of impairment (Fitzgerald 2006). Regarding the important role of self-efficacy, specifically in PE, few studies seem to investigate its relation to achievement for students with impairments. Adaption, translation and evaluation of standardized scales, as well as the development of new scales for self-efficacy in general and in specific subjects, in this study PE, need to be tested to guarantee appropriate conclusions (Mokkink et al. 2010).

Reliability in the SEQ-C indicate similar patterns with earlier findings (Muris 2001). Concerning validity, the result of the pilot study revealed insufficient loadings on the intended subscales of SEQ-C with difficulties to separate social and emotional self-efficacy beliefs. One explanation can be the limited number of participants in combination with the fact that most participants rated their self-efficacy high in the SEQ-C, thereby generating little variance in ratings. The analysis of the main study, including more participants, provided a result that fits better with the original analysis. Reformulations of items of low correlation in the SEQ-C proved to be successful.

The PE self-efficacy scales are developed based on the knowledge requirements in year 9, with the intent to link the content of the scale to the grounds on which teachers grade their students. National and international research claim that students are graded on measurable/observable physical achievement (López-Pastor et al. 2013, Redelius and

Hay 2012), which is contradictory in the Swedish goal-referenced grading system, since all core contents (movement, health and life-style, and outdoor life and activities) are to be graded. The finding that non-competitive PE activities such as dance represent one fourth factor is interesting, since it indicates that there are four, not three, core contents in PE. Concerning reliability, the moderate consistency of the subscale OutdoorSE may be explained by the fact that the students at the time of the pilot study had not yet encountered the subject field of outdoor life and activity after transition to secondary school. It is probable that the students interpreted the items individually, based on previous experiences. The result may indicate that scales based on syllabus content, require students to have experiences of all aspects of the syllabus to interpret items in the manner intended. Neither of the five students with mild intellectual disabilities responded to six items in the SE-PEH scale. A plausible explanation is that the teacher assisting the students with the questionnaire happened to be their PE-teacher, who knew they had not encountered these requirements in the course yet. One item each in the SE-PEH and PrePart scale could be interpreted as yes/no questions (ability to swim and to reach a passing grade) and were revised to be reported on a 1-6 rating scale (how good can you swim, and expected grade outcome in year 9 on an A-F rating scale). To further improve accuracy of ratings, explaining examples were added to the items in SE-PEH and PrePart. Modifications proved to be efficient when analyzing results from the main study.

The ability scale, AI, measuring functioning showed high internal attrition, low variability and the fact that the retest analysis is based on replies from 21 of 28 students indicate problems with usability for students without impairments. As this scale exclusively has been used as a proxy measure for students with disabilities (Simeonsson and Bailey 1991, Roll-Pettersson 2001) additional modifications were needed to ensure applicability in self-rating populations of typically functioning adolescents. The original

scale and the revised Swedish version are too detailed and graded from typical to atypical functional skills. Operationalization in the pilot study suggests reversing the rating. Results from the pilot study indicate that consistency in the AI can be improved by combining variables. Although weak factor structure, this was used as an indication of relevant factors and ways to revise the scale, as this analysis indicated two factors of physical and psychosocial functional skills. Combining physical functional skills, may be accurate for students of typical function, but may leave out relevant information from students with physical impairments. The main study would therefore benefit from establishing accurate cut-off points for either typical or atypical function in two separate dichotomous scales. Combining psychosocial functional skills proved in the main study its potential to adequately capture the students' perceptions in a PE setting on individual and class level.

Comparing the scales, the moderate correlations found between general self-efficacy, specific PE self-efficacy, and functioning indicate divergent validity. This is also indicated by weak correlations between prerequisites to participate, general self-efficacy and functioning. The scales measure different aspects of ability, mastery and competence, rather than the same construct. The strong correlation between prerequisites to participate and self-efficacy in PE indicate convergent validity, the will to participate is closely related to higher self-efficacy.

Another implication found was the need to accommodate and support students in need of special support when responding to questionnaires. A room separated from ordinary classroom may be used to stay on task. Difficult wording can be changed by reformulations, eliminating the amount of text or adding explaining examples. Additional time and the opportunity to partition the questionnaire to be completed at two, or more,

occasions can affect low persistence positively. Coloring of responses, reading the questions aloud and assisting in reporting when needed in this pilot study contributed to better understanding. Students with severe intellectual disabilities were not able to complete the original version of the questionnaire. In cases where a combination of low understanding and low persistence require further accommodation, a personal assistant equipped with the original, a simplified version of the questionnaire and a pictogram is suggested (Nicolaidis et al. 2015, Finlay and Lyons 2001).

Conclusion

Analyses in the pilot study display adequate quality in instruments measuring self-efficacy and prerequisites for participation. Internal consistency was confirmed or improved by results from the main study. The pilot study indicated that adjusting wording and providing support is necessary to full inclusion of all students in a total population from mainstream schools in studies that involve responding to questionnaires. Adequacy of adjustments made, have been confirmed by testing adaptations on the first wave of data collection in the main study. Convergent and divergent validity was tested and confirmed. The total scales each measure different aspects of student perceived competence. The instruments showed stability over time. The limited number of participants in the pilot study, negatively skewed distribution and low variance might be the reason why differentiation of intended factors was not possible in the SEQ-C, SE-PEH, and PrePart scale structure. Reasons for weaknesses could also be found in the phrasing of questions. Rephrasing questions into first person and providing explaining examples were revisions needed to improve accuracy. Two of the items could unintentionally be interpreted as yes/no questions, requiring reformulation to be reported on a rating scale. Plausible reasons for missing values may be difficult wording, low understanding, low persistence in completing the questionnaire, or a combination of these elements.

Implications for further Research

Student self-efficacy is closely linked to school performance. Having low self-efficacy decreases the likelihood of succeeding, which influences the amount of effort put into new challenging tasks. A trajectory of not attending and not investing energy consequently results in poor academic outcome and future health problems (Gustafsson et al. 2010). Together with the notion that vulnerable groups of students signal risk of

future failure by not wanting to attend in PE (Falkmer 2012) and feelings of exclusion from PE (Smith 2004), this needs to be further investigated and monitored over time. By measuring students' perceived self-efficacy and functioning the researchers aim to examine causal effects on participation and academic outcomes in future studies.

Strengths and limitations

Despite the small sample size of the pilot study, adaptations have proven to be adequate, and resulted in successful measures of student self-reports of self-efficacy, in general and in PE, prerequisites for participation and functional skills. This is confirmed by tests performed on the first wave of data collection in the main study. It may be argued that the sample size is too small to guarantee appropriate conclusions about reliability and validity of the instruments. Research concerning a vulnerable group such as students in need of special support includes ethical approval from the ethical board and collection of informed consent from the students and both their parents. Including students in need of special support also require adapting self-reported questionnaires to make them accessible to these students. These procedures are necessary, but time-consuming and consequently this group of students are often excluded from research in mainstream schools, not studied as a separate group, or give inadequate replies to questionnaires they do not understand. High number of missing values from students at the special school threatened the construct validity and therefore resulted in a decision only to include students with mild intellectual disabilities. This pilot study has clearly guided the process of accessibility. Results of analyses have given indications of procedures of data collection, and directions to improve the understanding of items. Consequently, students with diagnosed disabilities included in mainstream education can be studied specifically, and their answers be compared to other groups of students, those with high grades and those with low grades.

Investigation of physical, psychological and social environmental aspects of participation would have added further information to the prerequisites for participation. Such conditions include inclusive educational approaches, which make activities attractive to ensure engagement (Maxwell 2012).

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Conflicts of Interest

There are no conflicts of interest.

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Table 1. Descriptives of scales evaluated in the pilot study.

Scale	Items	n	Mean	SD	Skewness	Variance	Kurtosis
SEQ-C	24	44	3.8	0.60	- 0.84	0.36	0.49
		451	3.7	0.54	- 0.14	0.29	- 0.04
AcademicSE	8	44	3.9	0.72	- 0.63	0.51	- 0.16
		451	3.8	0.69	- 0.53	0.48	- 0.19
SocialSE	8	44	3.9	0.58	- 0.22	0.33	- 0.79
		451	3.8	0.62	- 0.37	0.38	0.13
EmotionalSE	8	44	3.6	0.81	- 0.95	0.66	1.10
		451	3.5	0.70	- 0.07	0.49	- 0.23
SE-PEH	20	42	5.1	0.58	- 0.37	0.34	- 0.51

		<i>451</i>	<i>4.5</i>	<i>0.85</i>	<i>− 0.67</i>	<i>0.72</i>	<i>0.61</i>
MovementSE	8	47	5.3	0.78	− 1.09	0.60	0.12
		<i>451</i>	<i>4.7</i>	<i>0.89</i>	<i>− 0.95</i>	<i>0.79</i>	<i>1.13</i>
HealthSE	7	42	5.0	0.70	− 0.44	0.49	− 0.16
		<i>450</i>	<i>4.2</i>	<i>1.02</i>	<i>− 0.48</i>	<i>1.04</i>	<i>− 0.18</i>
OutdoorSE	5	47	4.9	0.78	− 0.33	0.61	− 0.21
		<i>451</i>	<i>4.4</i>	<i>0.94</i>	<i>− 0.50</i>	<i>0.88</i>	<i>− 0.00</i>
PrePart	7	47	5.3	0.76	− 1.63	0.59	1.85
		<i>451</i>	<i>5.0</i>	<i>0.86</i>	<i>− 1.13</i>	<i>0.75</i>	<i>1.12</i>
AI	17	43	5.6	0.35	− 1.15	0.12	0.73
		<i>450</i>	<i>5.4</i>	<i>0.45</i>	<i>− 1.35</i>	<i>0.20</i>	<i>2.41</i>

Note: Total scales are bolded. *Italics = Results from main study.*

Table 2. Component analysis of total scales.

	KMO	Eigenvalue	Explained variance, %	Factors extracted
SEQ-C	.743*	8.6, 2.4	55	2
	.883*	4.7, 4.6, 3.5	49	3
SE-PEH	.739*	4.3, 2.6, 1.9	63	3
	.919*	6.2, 2.9, 4.5, 5.5	62	4
PrePart	.742*	3.4, 1.2	66	2
	.843*	3.3	47	1

Note: *Italics* = Results from main study. *Bartlett's test significant at $p < 0.001$.

Table 3. Internal consistency in the pilot test and the main study.

Total scale	Subscale	Pilot study	Main study
SEQ-C		.92	.88
	AcademicSE	.88	.84
	SocialSE	.72	.75
	EmotionalSE	.90	.78
SE-PEH		.88	.92
	MovementSE	.82	.82
	HealthSE	.84	.89
	OutdoorSE	.52	.76
PrePart		.78	.81
AI		.73	.73

Note: Pilot study n=39-44, main study n=412-443.

Table 4. Test-retest scores in the pilot study were estimated using Spearman's rho.

Scale	Spearman's ρ	Mean (SD)		Median (range)	
	$p < .01$				
	r_s	Time1	Time2	Time1	Time2
SEQ-C	.72	3.9 (.56)	3.9 (.79)	3.9 (2.6)	4.0 (3.1)
AcademicSE	.66	4.0 (.73)	4.0 (.80)	4.0 (2.6)	4.1 (2.9)
SocialSE	.55	4.1 (.65)	4.1 (.87)	4.0 (2.0)	4.0 (4.0)
EmotionalSE	.78	3.6 (.68)	3.7 (.88)	3.7 (3.1)	3.6 (3.9)
SE-PEH	.84	5.1 (.66)	5.2 (.75)	5.2 (2.2)	5.4 (2.6)
MovementSE	.85	5.3 (.77)	5.3 (.87)	5.5 (2.4)	5.8 (2.6)
HealthSE	.71	5.0 (.75)	5.1 (.67)	5.1 (2.9)	5.2 (2.6)
OutdoorSE	.63	4.9 (.92)	4.9 (1.0)	5.0 (3.5)	5.0 (4.0)
PrePart	.65	5.3 (.73)	5.4 (.66)	5.6 (2.4)	5.7 (2.0)
AI	.81	5.7 (.32)	5.7 (.46)	5.8 (2.4)	5.8 (1.8)

Note: *Text is bolded for total scales.

Table 5. Correlations determined by Spearman's rho, between self-efficacy, in general and PE, prerequisites for participation, and functioning.

Scale A	Scale B	Spearman's r_s		Explained variance (%) = r^2	
		Pilot study	Main study	Pilot study	Main study
SEQ-C	SE-PEH	.45**	.62**	21	38
SEQ-C	PrePart	.23	.53**	5	28
SEQ-C	AI	.42**	.58**	17	34
SE-PEH	PrePart	.66**	.76**	44	58
SE-PEH	AI	.51**	.44**	26	19
PrePart	AI	.37*	.39**	14	15

Note: **Spearman's Rho significant at $p < 0.01$. *Correlation significant at $p < 0.05$.

Table 6. Differences between students in need of special support, low grades and high grades regarding self-efficacy, prerequisites for participation and functional skills.

Group	Mean (SD)		
	Students in need of special support	Students with low PEH grades	Students with high PEH grades
SEQ-C	3.3 (1.56)	3.8 (.46)	4.1 (.43)
	<i>3.5 (.52)</i>	<i>3.6 (.57)</i>	<i>3.8 (.43)</i>
SE-PEH	4.6 (1.21)	4.9 (.56)	5.2 (.56)
	<i>4.2 (1.03)</i>	<i>4.4 (.83)</i>	<i>4.8 (.64)</i>
PrePart	4.7 (1.28)	4.7 (.93)	5.6 (.24)
	<i>4.6 (.97)</i>	<i>4.8 (.88)</i>	<i>5.2 (.69)</i>
AI	5.5 (.48)	5.6 (.30)	5.7 (.28)
	<i>5.2 (.43)</i>	<i>5.4 (.50)</i>	<i>5.6 (.36)</i>

Note: *Italics = Results from the main study.* Students with mild intellectual disability (n=5, n=30). Students with low grades in PEH, year 6 (n=8, n=36). Students with high grades in PEH, year 6 (n=22, n=55).

Appendix

Perceived self-efficacy in PEH (scale 1-6, 1=not good at all, 6=very good)

Report how you perceive your skills and abilities to...

MovementSE

- (6) ...participate in dance
- (7) ...participate with pace and rhythm in fitness programs For numbered lists
- (8) ...participate in games
- (9) ...participate in athletics
- (10) ...participate in obstacle courses
- (11) ...participate in gymnastics
- (12) ...participate in ball games
- (13) ...swim in various types of strokes

HealthSE

- (9) ...set up goals with my training and physical activity
- (10) ...choose, plan, carry out and evaluate my training and physical activity
- (11) ...talk about my experience of activity and effects on health and physical capacity
- (12) ...prevent injuries associated with games and sports
- (13) ...describe risks associated with physical activity
- (14) ...handle emergencies
- (15) ...reason about how activities together with dietary and other factors can
influence health and physical capacity

OutdoorSE

- (16) ...plan, organize and carry out outdoor life activities
- (17) ...act according to the rules of public access to land
- (18) ...adapt clothing to weather conditions
- (19) ...handle water emergencies
- (20) ...orient myself in unfamiliar environments using maps and other aids