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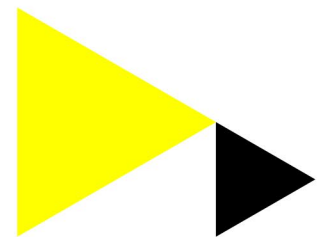
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Psychometric properties of the School Participation Questionnaire: testing a measure of participation-related constructs

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ABBREVIATIONS

ICC	Intraclass correlation coefficient
PEM-CY	Participation and Environment Measure for Children and Youth
SPQ	School Participation Questionnaire
Infit MnSq	Infit mean-square
Hi	Item scalability coefficients
Hs	Overall scalability coefficient
BFs	Bayes factors

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AIM To explore concurrent validity, convergent validity, interrater reliability, test–retest reliability, and Rasch model analysis of the School Participation Questionnaire (SPQ), a tool for teachers to assess personal and environmental determinants of school participation.

METHOD Teachers of children with additional support needs, including intellectual disability, autism, and learning difficulties completed measures. Data were collected using the SPQ and the Participation and Environment Measure for Children and Youth (PEM-CY). Test–retest and interrater reliability were assessed using intraclass correlation coefficients (ICCs). Internal consistency was assessed with Cronbach’s alpha. Concurrent and convergent validity were explored via correlations with the PEM-CY. Further psychometrics were examined using a Rasch model.

RESULTS One hundred and eighty-seven children (136 [72.7%] male; mean age 9y [range 5y 6mo–12y 10mo, SD 2y]) were assessed by 67 teachers. Cronbach’s alpha, test–retest, and interrater reliability were acceptable–excellent across each SPQ scale (alphas=0.89, 0.9, 0.94, 0.79; test–retest ICCs=0.64, 0.61, 0.78, 0.62; interrater ICCs=0.85, 0.71, 0.90, 0.81). Concurrent and convergent validity were confirmed with significant positive correlations between SPQ and PEM-CY. After Mokken and Rasch model analysis, person and item reliability were good, and unidimensionality was confirmed. Mean administration time was 8.2 minutes.

INTERPRETATION The results suggest that the SPQ is a rapid, reliable, and valid tool for assessment of participation-related indicators in schools.

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What this paper adds

- The School Participation Questionnaire (SPQ) is a short tool that demonstrates good validity and reliability.
- The SPQ supports teaching professionals to embrace complexity of need, create a working hypothesis about a child's situation, and provide an avenue for reasoning around participation.

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Inclusive education remains difficult to implement.^{1,2} Participation at school is a key aspect of inclusion.^{1,2} Research shows that students with additional support needs, including autism, learning difficulties, and intellectual disability, participate less frequently in school, are less involved in school activities, and are more likely to report environmental barriers.^{3–6} Participation is ‘involvement in life situations’,⁷ in this case education. The amount/frequency (attendance) and the quality or experience of participation (involvement) are measurement targets.^{8,9} However, understanding the amount or level of participation, whilst useful, does not explain why it might be restricted, or how to help. In tandem, understanding of the various factors which influence participation is required. Contemporary thinking on ‘participation-related constructs’ builds on the World Health Organization’s International Classification of Functioning, Disability, and Health definitions⁷ that ‘participation’, ‘body functions and structures’, and ‘activities’ exist in dynamic interaction with ‘health conditions’ (disease/symptoms) and ‘personal and environmental factors’. Concepts continue to be refined, with recent work^{8,9} defining participation-related constructs as physical and social structures (e.g. environment) and within person factors (e.g. interests, preferences, sense of self). To date, however, models have not been validated in schools or for teachers. Students with additional support needs have historically faced complex educational barriers^{1,2} and ongoing improvement of educational practices is important. New frameworks, models, and interventions are required for identifying, monitoring, and improving outcomes.^{1,2} A population and context-specific (students in inclusive schools) model of participation-related constructs and associated tool were required.

The School Participation Questionnaire (SPQ)¹⁰ reflects the need for a participation-related assessment for teachers. Development drew on the Medical Research Council complex interventions guidance,¹¹ COSMIN guidance,¹² and a novel conceptual framework of participation determinants which specified individual and environmental determinants of participation in schools.¹³ The

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determinants were (1) competence for school participation or 'doing', (2) school participation identity or 'being', (3) experience of mind and body or 'symptoms', and (4) environment.¹³ A tool was developed by a multiprofessional international group, and a pilot study¹⁴ ($n=101$ children) was completed, including expert review, Rasch model analysis, and feasibility assessment. Results showed acceptable fit to a Rasch model, and Cronbach's alphas which were greater than 0.8, indicating good internal consistency.¹⁴ The study provided initial psychometrics, and confirmed feasibility and utility of the SPQ for teachers in schools.¹⁴ However, further psychometric evaluation was required. In the current study, test–retest reliability, interrater reliability, and internal consistency were assessed. Concurrent and convergent validity were explored via correlations with an established participation-related tool, and with regard to children's demographics. Further validity aspects were examined using item response theory models.

METHOD

Context and sampling

Primary schools were sampled at random in a Scottish urban local authority. In Scotland, children usually begin primary school between the age of 4 years 6 months and 5 years 6 months, and attend for 7 years, before starting secondary education aged between 11 years 6 months and 12 years 6 months. The system is inclusive, with a majority educated in general schools, and a very small minority attending segregated special schools.¹⁵ Policy mandates for a baseline of universal inclusive practice. Interventions provided by classroom teachers are therefore commonplace. 'Support for learning teachers' may be involved in providing intervention where needs extend beyond those which can be met through typical measures. Escalating complexity may trigger external agencies, including health professionals and psychologists.

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Inclusion criteria

The leadership team in each school identified children who met the inclusion criteria, and selected participants using a lottery (aiming to provide equal proportions across each of the 7 years). Children were aged between 4 years 6 months and 12 years 6 months old, with a physical, developmental, behavioural, or emotional condition that required health and/or related services of a type or amount beyond that required generally. Categories of need reflected those used in national census records: learning disability; dyslexia; other specific learning difficulty (e.g. numeric); other moderate learning difficulty; visual impairment; hearing impairment; deafblind; physical or motor impairment; language or speech disorder; autistic spectrum disorder; social, emotional, and behavioural difficulty; physical health problem; or mental health problem.¹⁵ Children could have one or more condition/need.

Sample size

Six schools were recruited, with the aim to provide 25 to 35 children each. Such targets had previously been identified as feasible for school-led recruitment.¹⁴ A sample of more than 100 participants provides 95% confidence in calibrations plus-minus 0.5 logits for Rasch model analysis.¹⁶ Proposed minimum sample sizes required for reliability testing is greater than 20 participants, and other validity testing is greater than 80 participants.¹⁷

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Participants and procedures

Rasch model and Moken analysis, internal consistency, and validity assessment with the Participation and Environment Measure for Children and Youth (PEM-CY) were completed with the full sample (187 children). For reliability, subsamples were taken to minimize administrative burden for schools. For test–retest reliability (48 children), SPQs were completed twice, first at baseline, and after 3 weeks, by the same teacher. Interrater reliability (139 children) was assessed by comparing ratings between two teachers at baseline. See Tables S1 and S2 (online supporting information) for subsample composition.

Ethical issues

Queen Margaret University Ethics Committee and City of Edinburgh Local Authority (Local government) Research Access Committee provided approval. Each school's head teacher provided informed consent. Participating teachers provided informed consent. Participation was voluntary and schools and teachers were given the opportunity to opt out at any time. Parental consent was not sought, as teachers completed SPQs based on professional knowledge and school-held records. Children were not directly involved and all data were anonymized before release to the research team.

Measures

All measures were completed by teachers close to the child.

SPQ

The SPQ¹⁰ comprises four scales. Items are scored using response categories (1=Disagree to 4=Agree). The reference period is the previous 2 weeks. The 'competence' or 'doing' scale assesses choices, persistence, meeting expectations, performing roles, and skills, with higher scores indicating favourable characteristics (example: 'The child does what is expected of them'). The 'experience of mind and body' or 'symptoms' scale assesses the extent to which the child has displayed any of the following symptoms: lack of energy, tiredness/sleepiness, pain, low mood, and anxiety. Each item is positively worded, so higher scores indicate improved symptoms status (example: 'The child seems well-slept when they arrive for school'). The 'identity' or 'being' scale assesses the child's thoughts, feelings, knowledge, preferences, self-perceptions, and role perceptions, with higher scores indicating favourable characteristics (example: 'The child understands school routines'). The 'environment' scale measures the physical (spaces, objects) and social (peers, teachers, routines) school environment. Higher scores indicate a more facilitative environment (example: 'The school building is fully accessible to the child'). The SPQ is freely available online, inclusive of a manual and intervention strategies¹⁰ (item list in Tables S3 and S4, online supporting information).

PEM-CY

The PEM-CY¹⁸ was selected as one of the few measures that combines a contemporary assessment of participation and environment. The PEM-CY has moderate to good reliability and validity¹⁸ and has been used to measure participation in schools,^{4,5} home, and community.^{3,6} Frequency, involvement, and environment from the school module were used.¹⁸ Respondents score frequency (0=Never to 7=Daily) and involvement (1=Minimally involved to 5=Very involved) in activities. Frequency is calculated as the average of ratings. This calculation can be inclusive of the items that

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are scored 'Never' (0).¹⁸ Involvement is calculated as the average of all ratings except those marked 'Never'. In the environment scale, the respondent reports on environmental features/resources using the following options: (1) not an issue/usually helps, (2) sometimes helps, sometimes makes harder, (3) usually makes harder, (4) not needed/usually yes, (5) sometimes yes, sometimes no, and (6) usually no. A 'overall environment support' variable is calculated as the total number of items indicating 'usually helps/usually yes' or 'not an issue/not needed' divided by the total number of items, and multiplied by 100 (range=0–100).¹⁸ Use of this score to manage missing data is recommended.¹⁸ This was important as five items (10, 11, 12, 16, and 17) which require knowledge of out-of-school factors (such as transportation) were unanswerable by teachers, who were therefore instructed not to score these (Tables S3 and S4).

Demographics

Demographics collected included child age, sex, needs, school support, and teacher experience. Sample representativeness was explored through checks against a population-based census.¹⁵ We secured data on proportions of children with needs aggregated at school level, nationally, and locally. Summaries of characteristics of the population of children with needs were developed and compared. On review, the final sample demonstrated acceptable representativeness (see Appendix S1 and Table S5, online supporting information).

Statistics

Internal scale validity

Mokken analyses were conducted to confirm unidimensionality.¹⁹ Where individual item scalability coefficients (H_i) and overall scalability coefficient (H_s) are greater than or equal to 0.5, this shows strong evidence of unidimensionality.¹⁹ For assessment of Cronbach's alpha values greater than or equal to 0.7 are considered good.²⁰ A Rasch evaluation was conducted using a partial credit model.

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How well items conformed to the Rasch model was assessed through fit statistics. We focussed on Infit mean-square (Infit MnSq) values, which are less sensitive to extreme responses.²¹ Infit MnSq values should range from 0.5 to 1.5.²¹ Separation was also calculated. Separation gives an estimate of the spread of items or individuals along the continuum of ability and reflects the number of strata into which the sample can be divided.²¹ Related is reliability, providing the degree of confidence in estimates. Coefficients of 0.67 to 0.8 are fair, 0.81 to 0.9 are good, 0.91 to 0.94 are very good and greater than 0.94 are excellent.²² For strata, 2 to 3 are fair, 3 to 4 are good, 4 to 5 are very good and greater than or equal to 5 strata are excellent.²²

Concurrent and convergent validity: PEM-CY

Pairwise Bayesian correlations were performed. Throughout, we expected significant positive correlations between SPQ and PEM-CY scales. Two aspects were explored: first, concurrent validity explored correlations between each SPQ scale and the PEM-CY scales for participation attendance and involvement. We aimed to produce evidence to show SPQ scales were associated with participation outcomes. It is the interpretation of the SPQ scales as predictors, or drivers, of participation outcomes, which forms the concurrent validity hypothesis. Second, convergent validity was explored between the SPQ environment scale and the PEM-CY environment scale. In this case, we hypothesized correlations were due to both targeting the same construct (i.e., in-school environment factors). Throughout, target coefficients are necessarily lower because of the abstract nature of constructs. Coefficients lower than or equal to 0.2 infer little meaningful relationship, correlations greater than or equal to 0.5 indicate a good relationship, and correlations in-between indicate a moderate relationship.²³

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Validity: groups

An exploration of children's characteristics was also completed. Bayesian pairwise correlations and one-way analyses of variance were conducted for children's demographic characteristics and SPQ scores.

Reliability

Intraclass correlations (ICCs) were calculated. An ICC of less than 0.4 is poor, between 0.4 and 0.59 fair, between 0.6 and 0.74 good, and between 0.75 and 1 excellent.²⁴

A p-value of less than 0.05 was considered significant. A criterion of BF_{10} larger than 30 was set for Bayesian analyses.²⁵ Analyses were completed in SPSS version 23.0 (IBM Corp., Armonk, NY, USA) and RStudio (Version 1.4.1106; R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Characteristics of the 187 children and 67 teachers are given in Tables 1 and 2.

Accepted version: full text available from: <https://onlinelibrary.wiley.com/journal/14698749>**Table 1:** Demographics of children ($n=187$)

Children	<i>n</i>	%
Age, y:mo	Mean	SD; range
	9:0	2:0; 5:6–12:10
Sex		
Female	49	26.2
Male	136	72.73
Missing	2	1.07
Ethnicity		
White: British/Scottish/other	163	87.17
African	9	4.81
Asian: British/Scottish	8	4.28
Mixed/multiple/other	5	2.67
Missing	2	1.07
Primary language		
English	165	88.24
Other	19	10.16
Missing	3	1.6
Children's need classifications ^a		
Autistic spectrum disorder	37	19.79
Communication support need	22	11.76
Deafblind	0	0.00
Dyslexia	19	10.16
Hearing impairment	4	2.14
Language or speech disorder	30	16.04
Learning disability	20	10.70
Mental health problem	14	7.49
Other moderate learning difficulty	31	16.58
Other specific learning difficulty (e.g. numeric)	14	7.49
Physical health problem	19	10.16
Physical or motor impairment	18	9.63
Social emotional and behavioural difficulty	77	41.18
Visual impairment	9	4.81
Missing	9	4.81
School support level ^b		
I	57	30.48
II	47	25.13
III	65	34.76
Missing	18	9.63

^aChildren may be in multiple categories. Individual categories may not sum to 100%. 'Learning disability' matches definition 'intellectual disability'. Moderate and specific learning difficulties are umbrella terms for often co-occurring difficulties (dyslexia, dyspraxia, dyscalculia, attention-deficit/hyperactivity disorder). A child may be diagnosed with a learning difficulty where there is a lack of achievement for age/ability, or a discrepancy between achievement and ability. Dyslexia is recorded separately because of national practice, and impact on education. 'Communication support need' represents children who experience difficulties communicating and/or understanding others and is used in place of a more specific diagnosis. ^bLevel I: child's needs are managed by the class teacher; Level II: child's needs are managed with help from specialist or more senior teachers within the school; Level III: child's needs are managed with support from partnership services or agencies (e.g. therapists or psychologists).

Table 1: Demographics of teachers ($n=67$)

	<i>n</i>	%
Experience, y:mo	Mean	SD; Range
	10:0	8:7; 0:10–38
Role ^a		
Classroom teacher	57	85.07
SfL	3	4.48
Class teacher/SfL	2	2.99
Other	5	7.46
Full time		
Yes	53	79.10
No	11	16.42
Job share	3	4.48
Probationary ^b		
Yes	6	8.96

^aSfL teacher is an experienced teacher with school-wide responsibility for additional support of children. ^bA probationary teacher is in their first year after qualification. SfL, support for learning.

Internal scale validity

Cronbach's alphas were greater than or equal to 0.79, indicating good internal consistency (Table 3). The Mokken analyses was used to explore unidimensionality, by review of individual item scalability coefficients (H_i) and overall scalability coefficient (H_s) (Tables S6–S9, online supporting information). Coefficients for identity were $H_i=0.46$ to 0.67 with $H_s=0.58$ ($SE=0.037$). Coefficients for competence were $H_i=0.37$ to 0.73 with $H_s=0.58$ ($SE=0.03$). Coefficients for symptoms were $H_i=0.39$ to 0.57 with $H_s=0.50$ ($SE=0.04$). Automated item selection procedure with increasing homogeneity thresholds indicated that the items in each of these scales measured a unidimensional latent trait. Coefficients for environment ranged from $H_i=0.29$ to 0.63 with $H_s=0.46$ ($SE=0.04$). One item was unscalable, indicating it may not be tapping into the latent trait, and was removed from analysis.

Table 3 provides a summary of the Rasch model analysis (Tables S10–S13, online supporting information). As per recommendations,²⁶ we collapsed categories 1, 2, and 3 in one scale (environment scale) after an unsatisfactory evaluation of the response categories. After adjustment,

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thresholds and category measures increased appropriately, indicating categories captured increasing levels of the latent trait.

Person and item reliability were within the recommended levels for confidence in calibrations. Separation statistics confirmed this, indicating 2 to 4 'strata'. The majority of items were 0.5 to 1.5 Infit MnSq. One item in identity and environment, and two items in competence were misfitting (Infit MnSq >1.5).

Table 2: School Participation Questionnaire Cronbach's alpha, Rasch indicators, and reliability

Criterion ^{a,b}	Target	Environment	Identity	Competence	Symptoms
Cronbach's alpha	>0.7	0.89	0.9	0.94	0.79
Item reliability	>0.7	0.97	0.97	0.98	0.99
Item separation	–	6.05	5.76	7.51	8.48
Item strata ^c	>2	8.40	8.01	10.35	11.64
Person reliability	>0.7	0.82	0.83	0.9	0.73
Person separation	–	2.16	2.18	2.93	1.64
Person strata ^c	>2	3.21	3.24	4.24	2.52
Test–retest ICC (interval) ^d	>0.6	0.64 [0.49–0.70]	0.61 [0.49–0.70]	0.78 [0.71–0.84]	0.62 [0.51–0.72]
Interrater ICC (interval) ^d	>0.6	0.85 [0.74–0.91]	0.71 [0.53–0.83]	0.90 [0.83–0.95]	0.81 [0.67–0.89]

Cronbach's alpha and Rasch model analysis: $n=187$ children. Test–retest analysis: $n=48$ children. Interrater reliability analysis: $n=139$ children. ^aRecommended values for Rasch are based on Fisher.²² ^bCronbach's alpha values from Tavakol and Dennick.²⁰ ^cCalculated as ' $H=(4G+1)/3$ ', where G =item/person separation. ^d95% confidence interval. All ICC values were significant ($p<0.05$).

Convergent and concurrent validity: PEM-CY

For concurrent validity, each SPQ scale was significantly and positively correlated with the participation frequency and participation involvement scales of the PEM-CY (Table 4). The SPQ competence and identity scales demonstrated similarly strong correlations with participation frequency and participation involvement ($r=0.54$ and $r=0.66$, $BF_{10}>100$ and $r=0.57$ and $r=0.64$, $BF_{10}>100$). The SPQ symptoms scale had a weaker correlation with participation frequency and a moderate correlation with participation involvement ($r=0.27$ and $r=0.42$, $BF_{10}>100$). There were moderate–strong correlations between the SPQ environment scale and participation frequency and participation involvement ($r=0.46$ and $r=0.53$, $BF_{10}>100$). Convergent validity between the SPQ environment scale and PEM-CY environment scale was good ($r=0.67$, $BF_{10}>100$).

Table 3: Means, standard deviations, and Bayesian correlation analyses between SPQ scales and PEM-CY scales ($n=187$ children)

Scales	Mean (SD)	1	2	3	4	5	6
1 Identity ('being')	3.13 (0.67)	—					
2 Experience of mind and body ('symptoms')	2.93 (0.71)	0.51*	—				
3 Competence ('doing')	2.79 (0.78)	0.82*	0.56*	—			
4 Environment	3.5 (0.39)	0.67*	0.46*	0.70*	—		
5 Participation frequency	4.03 (1.28)	0.57*	0.27*	0.54*	0.46*	—	
6 Participation involvement	3.56 (0.95)	0.64*	0.42*	0.66*	0.53*	0.53*	—
7 Overall environment support	0.83 (0.11)	0.56*	0.47*	0.72*	0.67*	0.41*	0.54*

This table presents pairwise Pearson's correlation coefficients. Bayes factors (BF_{10}) for all correlations with statistically significant associations are marked (*) (indicates $BF_{10} > 30$, which shows strong support for relationships between the variables presented). Scales 1–4=School Participation Questionnaire (SPQ); scales 5–7=Participation and Environment Measure for Children and Youth (PEM-CY). SPQ scores range from 1–4, PEM-CY participation frequency ranges from 0–7; PEM-CY overall environment support ranges from 0–1; PEM-CY participation involvement ranges from 1–5.

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Validity: groups

One-way analyses of variance were conducted depending on children's level of school support (level 1=least support, level 3=most support). Children on levels I and II scored significantly higher than those in level III on identity (level I and level III mean difference=0.45, $p<0.05$; level II and level III mean difference=0.38, $p<0.05$) and competence (level I and level III mean difference=0.57, $p<0.05$; level II and level III mean difference=0.48, $p<0.05$). Similarly, children on level I scored significantly higher than those on level III on PEM-CY participation frequency (mean difference=0.72, $p<0.05$). Children on level I scored significantly higher on SPQ environment as compared to children on level III (mean difference=0.22, $p<0.05$). Children on level I also scored significantly higher on PEM-CY environment (mean difference=0.06, $p<0.05$) as compared to those on level III. There was no effect for child age on any SPQ scale. One-way analyses of variance on scores between class level P1 to P7 (P1 being the first class level, and P7 being the final) revealed one difference. For SPQ competence, P7 children scored significantly higher than P1 (mean difference=0.71, $p<0.05$).

Reliability

SPQ reliability was good to excellent (Table 3). Test–retest ICCs ranged from 0.61 to 0.78, inter-rater ICCs ranged from 0.71 to 0.90. Mean administration time was 8.2 minutes.

Finalization

Problematic items were noted for review with stakeholders. Although previous research had indicated the practical and conceptual relevance of items,¹⁴ we hypothesized that issues were related to ambiguity or poor wording. One item was edited in the identity scale. Two items received edits

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in the competence scale. Misfitting item 'equipment is managed well' and unscaleable item 'assistive devices and technology available meets the child's needs' were removed from the environment scale. The finalized SPQ included 44 items: identity (9 items); competence (11 items); symptoms (5 items); environment (19 items).

DISCUSSION

The SPQ is valid and reliable for measuring four participation-related dimensions. As hypothesized, SPQ scores demonstrated concurrent validity with frequency and involvement in participation, as measured by the PEM-CY. The correlations indicate the strongest relationships between participation involvement and SPQ competence, followed by identity, environment, and symptoms. A similar pattern was observed for participation frequency, with decreasing strength of relationships across competence, identity, environment, and symptoms. The pattern of results reflects the differential influences of personal and environmental determinants on frequency versus involvement in participation as highlighted in previous research.^{8,27}

An important finding is that, overall, the SPQ scales had stronger relationships with participation involvement than frequency. In schools, children have reduced control over activity choice. Where attendance is mandated (often the case in school), involvement may be the more important metric. Evidence on involvement and its related factors is therefore important, and assessments that capture this are desirable.

We demonstrated convergent validity between the PEM-CY environment scale and SPQ environment scale. It is important to note that five PEM-CY items, pertaining to out-of-school factors, such as finance, were not completed, as they would be unknown to teachers. Nonetheless, as a

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tool designed to capture in-school environment factors, the SPQ was correlated with the remaining in-school PEM-CY items. This supports the hypothesis that in-school environment factors were being captured by both scales.

Rasch item difficulty hierarchies were consistent across this and the previous study.¹⁴ Compared to the previous study, item reliability was higher and item separation and strata were greater in this larger data set. Person reliability was very slightly higher in the earlier study. Person separation, and hence strata, were similar between the studies, noting that the symptoms scale was again distinguishing two strata only in this and the previous study. Internal consistencies of the SPQ were high across both studies.

The SPQ was reliable over 3 weeks and demonstrated interrater reliability. Supported by brief paperwork, teachers were able to assess children with common issues (including autism, language disorders, and learning difficulties). Administration was less than 10 minutes.

We identified a cohort using school-based recruitment. This approach is feasible with acceptable representativeness when validated against a comprehensive population-based census.¹⁵ We found rates of additional needs to be broadly consistent with these other data.

Past findings suggest that while type or level of 'impairment' may influence participation, it is not the most important predictor in the context of other issues such as environment.^{8,13} We found that level of school support was negatively correlated with SPQ scores and PEM-CY scores, suggesting that those children receiving higher levels of support in school had more needs and more restricted participation. These children would have more complex functional, behavioural, and cognitive issues. This also indicates that although children were in receipt of extra input from specialized providers, teachers may have still required support and training on working with them, and thus participation was negatively impacted.

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For practitioners, the SPQ is a tool that can support assessment, audit, and research, meeting calls for improvements in participation practices.^{28–30} The SPQ is informative because children may have low participation for different reasons. A multidimensional assessment allows identification of a profile. Advance knowledge of low scores, for example in environment, could ensure targeted supports.

There are factors which limit generalizability. Although broadly representative of Scotland, the sample comprised fewer females than males, and primarily white Scottish children attending inclusive schools in one city. Nonetheless, the global context of increasingly inclusive education means the SPQ is likely to be of interest to teachers internationally. Further feasibility and psychometrics must be established, with ongoing validation, particularly if the tool is adapted for use in different countries. This study provides initial estimates towards that end. In order to improve the diversity of future samples, a greater range of schools across different areas nationally and internationally will be required.

Conclusion

The SPQ is a short teacher-report tool of participation-related indicators. This study provides initial evidence that users of the SPQ can be confident of construct validity, test–retest reliability, inter-rater reliability, and internal consistency.

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schools, teachers, researchers, and clinicians and can be used for the benefit of improving the participation of children in inclusive settings. The SPQ is free to use and is available online (www.thirdspace.scot).

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Supporting information

The following additional material may be found online:

Appendix S1: Sample representatives overview

Table S1: Child characteristics for each reliability study

Table S2: Teacher characteristics for each reliability study

Table S3: Finalized items and scales of the SPQ

Table S4: PEM-CY environment items not completed by teachers

Table S5: Child sample characteristics, local and national proportions of children with health-related additional support needs

Table S6: Identity 'being' scale Mokken model: homogeneity coefficients

Table S7: Experience of mind and body 'symptoms' scale Mokken model: homogeneity coefficients

Table S8: Competence 'doing' scale Mokken model: homogeneity coefficients

Table S9: Environment scale Mokken model: homogeneity coefficients

Table S10: Identity 'being' scale Rasch model analysis

Table S11: Competence 'doing' scale Rasch model analysis

Table S12: Experience of mind and body 'symptoms' scale Rasch model analysis

Table S13: Environment scale Rasch model analysis

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