Author/s:
Imms, C;Adair, B

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Participation trajectories: impact of school transitions on children and adolescents with cerebral palsy

CHRISTINE IMMS
BROOKE ADAIR

Centre for Disability and Development Research, Australian Catholic University, Fitzroy, Australia.

Correspondence to Professor Christine Imms at Level 2, Daniel Mannix Building, 17 Young Street, Fitzroy, 3065, Victoria, Australia. E-mail: Christine.imms@acu.edu.au

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ABBREVIATIONS
CAPE Children's Assessment of Participation and Enjoyment
PAC Preferences for Activities of Children
VCPR Victorian Cerebral Palsy Register

[abstract]

AIM To describe participation trajectories, and impact of school transitions on those trajectories, of children with cerebral palsy (CP).

METHOD This population-based longitudinal study assessed participation in activities outside school of children with CP born in 1994/1995. Eligible children contributed data between two and five occasions over 9 years, and had parents with sufficient English proficiency to complete the measures: the Children's Assessment of Participation and Enjoyment, and the Preferences for Activities of Children. Linear mixed models were used to assess the relationships between participation and age and the impact of transition.

RESULTS At study commencement (2006), 233 children with CP born in 1994/1995 were registered in Victoria; 93 (51 male, mean age 11y 2m, age range 10–12y) contributed longitudinal data. Participation diversity and intensity decreased over time for recreational, active physical, and self-improvement activities ($p<0.009$). Social participation increased over time: diversity, intensity, and frequency ($p<0.007$). All of the identified slopes were generally small ($\beta \leq 0.11$, 1-point change every 9y) except for recreational diversity scores ($\beta = -0.29$). Transition from primary and secondary school had little impact on participation.

INTERPRETATION Findings of increased social participation over time are encouraging. Declining participation in other activity types suggests that action is needed to ensure that meaningful recreation and leisure activities are maintained as adolescents with CP transition to adulthood.

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Participation Trajectories of Adolescents with CP *Christine Imms and Brooke Adair*

What this paper adds

- Leisure participation was generally stable or decreased slowly with time.
- Only participation in social activities increased longitudinally.
- Diversity of participation in recreational activities demonstrated largest longitudinal decline.

[main text]

Participation has been a focus of childhood-disability research since publication of the International Classification of Functioning, Disability and Health, although some discourse in the literature suggests a lack of consensus regarding what constitutes participation. After a two-part systematic review of childhood disability research, a Family of Participation and Participation-Related Constructs was developed.[1] In this framework, participation is defined as having two key elements: attendance and involvement.[1] Attendance pertains to the number of activities or frequency of taking part in activities; involvement to the 'in the moment' experience of participation.[1] When investigated within the childhood disability field, the involvement aspect of participation was described from the perspective of engagement, persistence, affect (feelings while participating), and on occasion the social connections observed while children participate.[1] In addition, authors described within-person elements that are important precursors to, or consequences of, participation: activity competence, sense-of-self, and preferences.[1] These elements, while related to participation, are not synonymous with participation.[1]

Participation in recreation and leisure activities has an important relationship with health and wellbeing.[2] Children and adolescents with cerebral palsy (CP), however, are more likely to experience participation restrictions than people without impairments,[3] including participating less frequently, and in fewer leisure activities.[4,5] Young people with physical impairments have identified that leisure means fun, freedom of choice, and provides fulfilment, friendship, and a sense of belonging. These themes relate to theories of self-determination,[6] providing additional evidence of the importance of understanding, and enhancing the recreation and leisure participation of adolescents with impairments.

Most prior participation research of children with CP has been cross-sectional and provides some evidence that age is a determinant of participation. Cross-sectional research cannot, however, build evidence about life course patterns. Longitudinal studies can describe developmental trajectories, and can evaluate the impact of transition points within the trajectory.[7] Trajectories are defined as 'the path followed … under the action of given forces'

and transitions as the processes or periods in which there is a 'change from one state to another'.[8] This study evaluated two transitions: from primary school to secondary school; and the one associated with leaving secondary school. Although these transitions are socially determined, typically age-based, and predictable,[7] we aimed to investigate their impact, over and above age, because the transitions result in a new environment and social context for the child, and children with impairments may not transition with their age-based cohorts. In this study therefore, children were considered to have transitioned if they physically changed school between primary and secondary school and when they left school after Year 12.

To our knowledge, two previous studies have provided longitudinal data describing participation of young people with CP.[9,10] Kerr et al.[9] studied participation changes over 2 years, 7 months in a population-based cohort using the Lifestyle Assessment Questionnaire.[11] Although they reported improved participation outcomes,[9] the authors acknowledged that the Lifestyle Assessment Questionnaire may not be a robust measure of participation because it provides a composite score for a range of dimensions that may not constitute participation.[11] Majnemer et al.[10] assessed changes in leisure participation over 5 years in 38 children in late childhood and then mid-adolescence. These authors demonstrated reduced recreational, skill-based and self-improvement participation, with primarily stable preferences.

King et al.,[12] Anaby et al.,[13] and Cairney et al.[14] undertook longitudinal studies of participation of children with conditions other than CP. King et al.[12] demonstrated a reduction in participation in recreational, active–physical, and social activities over a 3-year period in a cohort of 402 children with various physical disabilities, including CP.[12] Anaby et al.[13] studied change in participation in 136 children with acquired brain injury immediately after return to school and at 6 and 12 months. These authors[13] described increasing trajectories of participation in recreational, active–physical, and social activities using the Children's Assessment of Participation and Enjoyment (CAPE)[15] for those with mild injuries, compared with stable or reducing participation in those with non-mild injuries. Cairney et al.[14] studied longitudinal participation changes using an activity questionnaire with 111 children with developmental coordination disorder and 1972 children without impairments. They found reduced participation in organised and free play activities in the developmental coordination disorder group, and that differences persisted between Grade 4 and Grade 6.[14]

Although Kerr et al.[9] and Majnemer et al.[10] assessed participation over several years, they measured participation only twice. This approach only allows the description of linear change, and thus may miss other patterns of change. Anaby et al.,[13] Cairney et al.,[14] and King

et al.[12] all collected data on three or more occasions; however, each followed children over relatively short periods (12–36mo) and none focused on transition within the longitudinal period. Given the relative stability of participation trajectories identified in children with typical development,[16] studies that follow participants longitudinally over several years are required to enhance our understanding of participation outcomes.

This article builds on previously published cross-sectional information,[4] and reports results of a longitudinal study of participation for a population-based sample of children and adolescents with CP. The aim of this study was to contribute to knowledge about the life course development of participation patterns of children and adolescents with CP.

The primary research questions were: (1) What are the participation trajectories between late primary school and 1 year after completion of secondary school (a period of 9 years)? (2) Do key life-stage transitions (i.e. primary to secondary school, and secondary to post-secondary time points) result in significant changes in participation profiles in activities outside school?

METHOD

Design

This prospective, population-based study involved repeated measures between 2006 and 2015. All participants and their families provided informed consent. The study was approved by the human research ethics committees of La Trobe University (#05–153) and The Royal Children's Hospital (#25096) and registered at the Australian Catholic University (#V2011–146).

Participants

Children with a diagnosis of CP born in Victoria, Australia in 1994 or 1995 were eligible for inclusion. Because of the reliance on written outcome measures, children whose parents had insufficient English language proficiency to support completion of the surveys were excluded. The primary aim of the study was to assess changes in participation over time, so only data from participants with at least two assessments were included in the analyses.

Sampling and recruitment

The Victorian Cerebral Palsy Register (VCPR) was used as the primary sampling frame. An attempt was made to locate children not on the register through advertising at organisations

known to provide services to children with disabilities. VCPR ascertainment rates in 2006 were 1.55 and 1.84 per 1000 live births for 1994 and 1995 respectively, slightly less than the anticipated population prevalence.[17] Because we aimed to recruit the known Victorian population, no sample size calculation was undertaken. All registered potential participants were initially contacted by the child's paediatrician or primary care clinician seeking agreement for the researchers to contact the families. The paediatricians and primary care clinicians were made aware of the study through distribution of study fliers. After consent, caregivers and children were sent the survey package in the mail.

Measures

Participation was measured using the CAPE and the Preferences for Activities of Children (PAC).[15] The CAPE and PAC include 55 activities divided into five activity types: recreational (12 activities), active physical (13 activities), social (10 activities), skill-based (10 activities), and self-improvement (10 activities). The CAPE questions elicit whether the child has completed the activity in the previous 4 months (diversity score, range 0–13, maximum scores range up to 10–13 depending on the activity type), how often the activity was completed (intensity score, range 0–7), with whom and where they did it (not reported in this paper), and their enjoyment of the activity (range 1–5).[15] Because the intensity score is a measure of relative frequency,[18] data are also presented for frequency of participation, calculated as the average frequency of the activities actually performed in the past 4 months (score range 0–7). The PAC asks how much the child would like to be able to do each activity given a choice (preference score, range 1–3).[15] The five scales for each activity type were calculated when more than or equal to 80% of the data were available. The CAPE and the PAC have demonstrated validity and reliability for children aged 6 to 21 years,[15,19] and were completed by the child using the paper record booklet, or with caregiver assistance if deemed necessary by the caregiver. The respondent was documented on the front of the CAPE/PAC. No specific cultural validation was undertaken for the Australian context; however, the CAPE/PAC have been used extensively in Australia, including completion of normative data collection that supports their validity for this context.[16]

Participant characteristics were collected via a study-specific questionnaire. Child-characteristics included age, sex, Gross Motor Function Classification System (GMFCS),[20] Manual Ability Classification System (MACS),[21] and school year level. Family and environmental characteristics included the number of parents living in the household, home

location, parental country of birth (to provide family cultural background information), socio-economic index for areas (SEIFA) advantage/disadvantage score, which is a relative measure of resources within a small geographical area (250 households),[22] and the type of school that the participant attended (public or private mainstream, special developmental or mixed).

Follow-up procedures and time points

Contact with recruited participants was maintained through thank you letters, birthday cards, newsletters, and invitations and reminders to take part in subsequent waves of data collection, with tokens of appreciation (a Commonwealth Games commemorative coin and study magnet) provided after the first three waves of data collection. Data collection commenced in 2006 (Wave 1), when it was anticipated that children born in 1994 or 1995 would be in Grade 5 or 6 – late primary school. The second assessment occurred 12 months later (Wave 2), and/or when the children had transitioned to secondary school (Wave 3, 12 months after Wave 2). The next assessment was done in the final year of secondary school, (Wave 4), and the final occasion was 12 months after school leaving (Wave 5). Therefore, participants had up to five occasions of assessment (see Appendix S1, online supporting information). Telephone and postal reminders were provided if completed questionnaires were not returned within 2 to 4 weeks.

Data analysis

All data were provided using paper-based questionnaires. Trained researchers transferred the data from paper to electronic form and data quality was independently checked before analysis. Participant characteristics were summarised descriptively. Baseline characteristics were compared with data from the VCPR using a χ^2 test to confirm the sample was representative in terms of proportions in each birth year, sex, GMFCS level, topographical distribution, and motor type. The normally distributed SEIFA advantage/disadvantage scores were compared with the Australian average of 1000 (standard deviation [SD] 100) using a one sample *t*-test, performed using SPSS Statistics Version 20.0 (IBM Corp., Armonk, NY, USA).

Participation trajectories were assessed using a linear mixed model to determine the relationship between participation and age.[23] This approach accounted for the dependency in the data, the disparate time intervals between assessments, and the varied number of

assessments completed by each participant.[23] The participant's study identification number was used as a random effect and the child's age (y) as the fixed effect.

Two subgroup analyses assessed the impact of school transition. To assess the impact of the first transition (primary to secondary school), participants were grouped based on whether they changed schools at the end of primary school. Participants with assessments during Grade 6 (end of primary school) as well as Year 7 (beginning of secondary school) who changed schools were categorised as the 'transitioned' group. Some children did not transition because they attended a special development school that provided education from kindergarten to the end of secondary school. Participants were categorised as not transitioning if they had two assessments 1 year apart while attending the same special development school and were 12 years old before the 31st of April in the year of their second assessment, the criterion date for school entry in Victoria. During the subgroup analyses the transition group category was added to the model as a fixed effect. An interaction between the transition category and age was investigated to compare the participation trajectories for each group.

To assess the impact of the second transition, analyses included participants with two assessments: one in the final year of secondary school, and another 1 year later. A linear mixed model was used to analyse the participation trajectories with the participant identification number included as the random effect and age as the fixed effect. This was an exploratory study therefore Bonferroni corrections were not applied. All longitudinal analyses were undertaken using Gen-Stat 17th Edition (VSN International, Hemel Hempstead, UK), and alpha set at 0.05.

RESULTS

Details of recruitment and study completion are provided in Appendix S1 (online supporting information). The study sample (n=93, 42.5% of the living population of children born in 1994/1995 who were registered on the VCPR) had a higher proportion of children classified in GMFCS level II, compared with children from the VCPR who were not recruited. However, the sample was representative of the total VCPR population in terms of proportion of males (54.8%), birth year (1994=43.0%; 1995=57.0%), GMFCS, topographical distribution, and motor type (Table I). There was no difference between the sample SEIFA advantage/disadvantage score (mean 1000.6, SD 87.2) and the Australian SEIFA score (mean 1000, SD 100; $t_{(91)}$=0.07, p=0.944).

Data describing the longitudinal linear changes in participation are presented in Tables II, III, and IV and the supplementary graphs provided online. There was evidence that participation diversity and intensity decreased over time for recreational (diversity: β=–0.29, 95% CI –0.36 to –0.22; intensity: β=–0.11, 95% CI –0.14 to –0.08), active–physical (diversity: β=–0.11, 95% CI –0.17 to –0.05; intensity: β=–0.03, 95% CI –0.05 to –0.01), and self-improvement (diversity: β=–0.08, 95% CI –0.13 to –0.03; intensity: β=0.05, 95% CI –0.08 to –0.02) activities. Preferences for each activity type, except social activities, also decreased over time (β=–0.02 to –0.04; p<0.001 to 0.030). The diversity, intensity, and frequency of participation in social activities increased over time (diversity: β=0.08, 95% CI 0.02 to 0.14; intensity: β=0.06, 95% CI 0.03 to 0.09; frequency: β=0.04, 95% CI 0.01 to 0.07), while social preferences remained stable (β=<0.01, 95% CI –<0.01 to 0.01). All β-coefficients, except that for recreational diversity (β=–0.29), were relatively small (β≤0.11) suggesting slow rates of change.

Table III displays changes in participation for the group who transitioned to a different school after Grade 6 (n=48) alongside the group who did not transition (n=15), and provides estimates of the differences in change between the groups. Recreational participation (diversity, intensity, and preference) reduced within the group who transitioned to secondary school. Enjoyment of self-improvement activities reduced within the group that did not transition. The groups' trajectories were different from each other only for enjoyment of self-improvement activities, which reduced in the non-transitioning group while remaining stable in the transitioning group.

Thirty participants contributed data at the second transition point: Year 12 to 1 year after. Only two dimensions changed in this 12-month period: the frequency and enjoyment of social activities increased (Table IV).

DISCUSSION

This longitudinal study has provided empirical evidence of changes in participation in activities outside mandated school among children and adolescents with CP. There were reductions in the attendance element (diversity, intensity, or frequency) of participation over time, particularly in recreational, active physical, and self-improvement activities. Participation in social activities increased, and participation in skill-based activities remained stable. No changes were seen in participation involvement, which was operationalised as the CAPE enjoyment scale, for any activity type over time. Despite statistical evidence, the

amount of change in participation was typically small, suggesting that longitudinal changes in school-aged children and adolescents with CP occur at a slow rate.

Preferences for particular activities, while not synonymous with the participation construct, are strongly associated with participation outcomes and can impact attendance and involvement.[1] In contrast to prior research where preferences were mostly stable,[10] this study demonstrated a reduction in preferences for each activity type, except social activities. Prior research suggests that, for adolescents, having fun was the primary predictor of physical activity preferences, and that the sense of energy and health gained, social aspects, and a sense of mastery was what made sport fun.[24] Further understanding of the preference construct in relation to leisure and recreational participation is warranted. This is because assisting children to experience participation as positive and successful is likely to build strong preferences,[25] and thus be an avenue for enhancing participation outcomes.

The findings of this study are consistent with those observed previously for participation intensity in recreational and active physical activities.[10,12] King et al.[12] did not find a reduction in self-improvement activities but did report a reduction in social activities, which is different to the participation patterns identified in the current study and that of Majnemer et al.,[10] who found that social participation was stable. Possible explanations for the differences in findings across the three studies include sociocultural differences between Canada[10,12] and Australia, the length of time over which the phenomenon was studied (3,[12] 5,[10] or 9 years), the frequency of assessment (63.4% of our participants having ≥3 assessments), and the differences in the samples (those with various physical disabilities[12]; only ambulatory CP[10]; or all levels of severity of CP reported here). With the exception of the somewhat larger slopes identified within the recreational activity domain, both King et al.[12] and the current study reported small slope values, suggesting that changes in participation, as measured by the CAPE, occur slowly.

Consistent with the overall slow rate of change, transition between schools or after completion of school had little impact on participation in recreational activities outside school. Both transition points included a 12-month period between occasions of measurement. In the younger cohort, those that moved to secondary school reported reduced participation in recreational activities, a finding that is consistent with prior cross-sectional research in children both with and without impairments.[5] It is possible that transition to secondary school provides a boundary after which the toys and games of younger childhood are left behind. This change was not evident in those children who attended a special

development school and did not transition. For these latter children there was an important, and significant, reduction in enjoyment of self-improvement activities.

On leaving secondary school, there was evidence that participation frequency and enjoyment in social activities increased over the 12-month period; all other dimensions and activities remained stable. This finding, and the overall increase in social participation, is a positive finding in this cohort, although findings should be interpreted cautiously because of the lack of comparative data from adolescents without impairments. The importance, to all people, of social connections is well established; for those with disability, for whom there is prior evidence of increasing isolation as they move into adulthood,[26] it is particularly important. In the CAPE, social activities tend to be informal (e.g. talking on the phone, hanging out, visiting) or potentially more sporadic (e.g. going to live events, full day outings), rather than formal. While there are health and wellbeing benefits from informal social participation, there are also benefits from formal, structured participation experiences,[27] in which social connections can also be embedded, and that for this cohort were declining. Further investigation of the predictors of activity-specific longitudinal changes in participation are warranted.[12]

In the smaller cohort where data were available for analyses during the second transition, it is possible that some effects were missed. In particular, and consistent with Majnemer et al.,[10] there appears to be an important reduction in frequency and enjoyment of participation in skill-based activities (frequency: β=–0.48, 95% CI –0.99 to 0.03, p=0.071; enjoyment: β=–0.17, 95% CI –0.34 to <0.01, p=0.068). As skill-based activities include more formally arranged activities (e.g. music, swimming, horse riding), this reduction may be explained by the participants' change in desire for organised leisure activities, or it may be associated with age-related exclusions that can occur after school leaving. Future studies with larger sample sizes are warranted to investigate these findings.

The importance of longitudinal data to understanding life course development has long been understood[7]; so too has the difficulty in obtaining longitudinal data from a sufficiently large sample to provide precise estimates of the effects.[28] Despite implementing a range of communication strategies, the loss to follow-up in this study was significant, and therefore the results can only be considered preliminary. The findings are strengthened by the initial sampling methods, the continued involvement of adolescents across all levels of severity of CP, and that 50 participants (of 93) had assessments spanning at least 6 years. The uneven and small sample sizes in the subgroup transition analyses may impact the

generalisability of these results. Nonetheless, this population-based, observational study included all possible data in the analyses.

It was not possible, in this study, to examine the outcomes according to differing levels of impairment (e.g. by GMFCS level) because of the sample size. However, past findings suggest that while level of impairment could influence initial level of participation, it was not an important predictor of change in participation.[12] Although we defined transition as the process of physically changing school environments, it is possible that some children who did not change schools experienced changes in their learning environment associated with transitioning from primary to secondary school-life. Data were not collected to describe the participants' learning environments, therefore we could not determine whether children's transition experiences within school differed to those who transitioned between schools. Further investigation of the impact of broader environmental and contextual factors on participation outcomes is warranted.

Conclusions

The findings of this longitudinal study highlight which aspects of participation appear vulnerable to reductions over time, and therefore can inform choices made as adolescents move through important life transitions. Consequently, the results are important to families and young people diagnosed with CP, as well as those supporting their health and educational development. Further investigation of the variables that support continued, or increased, levels of participation in activities outside school – as well as how these participation trajectories compare with those of other peer groups – will enable health, education, and community recreational professionals to provide focused support to children, adolescents, and young adults.

SUPPORTING INFORMATION

The following additional material may be found online:

Appendix S1: Flow diagram of participants in the study.

Figure S1: Longitudinal change in diversity for all five activity types.

Figure S2: Longitudinal change in intensity scores for all five activity types.

Figure S3: Longitudinal change in frequency scores for all five activity types.

Figure S4: Longitudinal change in enjoyment scores for all five activity types.

Figure S5: Longitudinal change in preference scores for all five activity types.

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Table I: Baseline participant characteristics for each comparison

	Total group (n=93)[b]		Transition 1				Transition 2	
			Did transition (n=48)[c]		Did not transition (n=15)		All transitioned (n=30)[d]	
	n	%	*n*	%	*n*	%	*n*	%
Sex								
Male	51	54.8	23	47.9	11	73.3	18	60.0
Female	42	45.2	25	52.1	4	26.7	12	40.0
GMFCS								
Level I	21	22.6	17	35.4	1	6.7	7	23.3
Level II	35	37.6	18	37.5	5	33.3	13	43.3
Level III	10	10.8	4	8.3	1	6.7	3	10.0
Level IV	8	8.6	5	10.5	2	13.3	2	6.7
Level V	19	20.4	4	8.3	6	40.0	5	16.7
MACS								
Level I	19	20.4	11	22.9	2	13.3	6	20.0
Level II	34	36.6	20	41.6	4	26.7	13	43.3
Level III	15	16.1	9	18.8	4	26.7	5	16.7
Level IV	8	8.6	5	10.5	1	6.7	3	10.0
Level V	17	18.3	3	6.2	4	26.7	3	10.0
Family type								
Single parent	21	22.8	11	23.4	4	26.7	7	23.3

Two parents	71	77.2	36	76.6	11	73.3	23	76.7
Home location [a]								
Major city	64	69.6	38	79.2	13	86.7	23	79.3
Inner regional	23	25.0	7	14.6	2	13.3	5	17.2
Outer regional	5	5.4	3	6.3	-	-	1	3.5
COB of parents								
Both Aus	65	69.9	30	62.5	10	66.7	19	63.3
Both other	11	11.8	6	12.5	4	26.7	5	16.7
Mixed Aus and other	17	18.3	12	25.0	1	6.7	6	20.0
School type								
Public	51	54.8	36	75.0	-	-	17	56.7
Private/catholic	12	12.9	9	18.8	-	-	3	10.0
SDS	25	26.9	2	4.2	13	86.7	8	26.7
Mixed SDS and other	5	5.4	1	2.1	2	13.3	2	6.7
Grade at school								
3	1	1.1						
4	6	6.5						
5	35	37.6						
6	23	24.7						
Ungraded/SDS	28	30.1						

[a]Home location was categorised using Remoteness Area data from the Australian Bureau of Statistics. Remoteness relates to distance from, and accessibility to, goods, services, and social interaction: major city, relatively unrestricted; inner regional, some restrictions; outer regional, significant restrictions. [b]*n*=92 (rather than 93) participants provided information about family type and home location. [c]*n*=47 (rather than 48)

participants provided information about family type. [d]*n*=29 (rather than 30) participants provided information for home location. Transition 1, transition period from primary to secondary school (*n*=63); Transition 2, transition period from Year 12 to the year after secondary school completion (*n*=30). GMFCS, Gross Motor Function Classification System; MACS, Manual Ability Classification System; COB, country of birth; SDS, special developmental school. Percentages reported are within group for each comparison.

Table II: Participation trajectories for all participants (*n*=93) for each dimension of the five Activity Types

Activity Type	Dimensions	Baseline values [a]		Constant	β-coeff	95% CI [b]	*p*-value
		Mean	SD				
Recreational	Diversity	7.84	2.45	7.03	–0.29	–0.36 to –0.22	<0.001
	Intensity	3.33	1.17	3.01	–0.11	–0.14 to –0.08	<0.001
	Frequency	5.02	0.72	5.15	0.03	–<0.01 to 0.06	0.058
	Enjoyment	4.01	0.58	4.01	<0.01	–0.02 to 0.02	0.731
	Preference	2.32	0.36	2.21	–0.04	–0.05 to –0.03	<0.001
Active Physical	Diversity	3.40	2.01	3.20	–0.11	–0.17 to –0.05	0.001
	Intensity	1.24	0.72	1.19	–0.03	–0.05 to –0.01	0.009
	Frequency	4.31	1.27	4.30	–0.01	–0.06 to 0.04	0.683
	Enjoyment	4.04	0.84	4.06	0.02	–0.01 to 0.05	0.281
	Preference	2.19	0.39	2.09	–0.03	–0.04 to –0.02	<0.001
Social	Diversity	7.06	1.76	7.23	0.08	0.02 to 0.14	0.007
	Intensity	2.73	0.90	2.89	0.06	0.03 to 0.09	<0.001
	Frequency	3.86	0.86	4.00	0.04	0.01 to 0.07	0.003
	Enjoyment	4.24	0.63	4.27	<–0.01	–0.02 to 0.02	0.707
	Preference	2.60	0.35	2.61	<0.01	–<0.01 to 0.01	0.531
Skill-based	Diversity	2.18	1.42	2.14	<–0.01	–0.05 to 0.05	0.998
	Intensity	1.00	0.66	1.00	<0.01	–0.02 to 0.02	0.699
	Frequency	4.21	1.32	4.23	–0.01	–0.06 to 0.04	0.614
	Enjoyment	4.30	0.82	4.35	0.01	–0.02 to 0.04	0.681

	Preference	2.09	0.45	2.01	–0.02	–0.03 to –0.01	0.030
Self-improvement	Diversity	4.63	2.23	4.43	–0.08	–0.13 to –0.03	0.007
	Intensity	2.38	1.13	2.22	–0.05	–0.08 to –0.02	<0.001
	Frequency	4.90	0.89	4.82	–0.01	–0.04 to 0.02	0.434
	Enjoyment	3.39	0.80	3.38	0.01	–0.01 to 0.03	0.420
	Preference	1.90	0.45	1.85	–0.02	–0.03 to –0.01	0.003

[a]Baseline values refer to those taken during the first wave of assessment in 2006; the participant numbers ranged from 82 to 93, depending on the variable. The constant has been calculated for the average age of participants at the time of assessment throughout the study period and therefore provides the value of the fitted regression line at x=13 years 9 months. [b]95% CI=95% confidence intervals for the β-coefficient. β-coeff=β-coefficient, indicates the average degree of change over time, for example a β-coefficient of –0.33 for recreational diversity would mean that overall participants experienced a decrease in one recreational activity every 3 years. The 95% CI of the β-coefficient provide estimates of precision for the change over time. Interpretation of β-coefficient values is influenced by the measurement scale and maximum score of the Dimension scale: Diversity: min score=0, max score=10–13; Intensity=0–7; Frequency=0–7; Enjoyment=1–5; Preferences=1–3

Table III: Change in participation at the first transition between those who transitioned and those who did not at the end of primary school

Activity type	Dimensions	Grade 6 to Year 7 school transition (*n*=48)				No school transition (SDS) (*n*=15)			
		Constant	β-coeff	95% CI[b]	*p*-value	Constant	β-coeff	95 % CI[b]	*p*-value
Recreational	Diversity	7.65	–0.69	–1.22 to –0.16	0.013	6.63	–0.11	–0.57 to 0.35	0.656
	Intensity	3.21	–0.32	–0.55 to –0.09	0.007	2.78	0.06	–0.24 to 0.36	0.715
	Frequency	5.05	–0.04	–0.23 to 0.15	0.649	5.10	0.01	–0.36 to 0.38	0.970
	Enjoyment	4.03	–0.03	–0.17 to 0.11	0.649	4.20	0.03	–0.27 to 0.33	0.863
	Preference	2.25	–0.08	–0.15 to –0.01	0.018	2.39	0.02	–0.19 to 0.23	0.875
Active Physical	Diversity	3.90	–0.37	–0.88 to 0.14	0.162	2.33	–0.30	–0.85 to 0.25	0.295
	Intensity	1.35	–0.06	–0.23 to 0.11	0.490	1.03	–0.03	–0.25 to 0.19	0.824
	Frequency	4.36	0.09	–0.20 to 0.38	0.549	4.15	0.03	–0.66 to 0.72	0.941
	Enjoyment	4.10	–0.07	–0.24 to 0.10	0.444	4.10	0.23	–0.10 to 0.56	0.210
	Preference	2.16	–0.05	–0.12 to 0.02	0.174	2.13	–0.05	–0.26 to 0.16	0.637
Social	Diversity	7.20	–0.18	–0.62 to 0.26	0.436	6.50	–0.11	–0.81 to 0.59	0.770
	Intensity	2.92	–0.03	–0.23 to 0.17	0.778	2.38	–0.13	–0.39 to 0.13	0.324
	Frequency	4.04	0.11	–0.10 to 0.32	0.312	3.67	–0.14	–0.44 to 0.16	0.376
	Enjoyment	4.36	0.04	–0.11 to 0.19	0.630	4.18	0.05	–0.17 to 0.27	0.671
	Preference	2.63	–0.03	–0.09 to 0.03	0.377	2.61	0.07	–0.11 to 0.25	0.460
Skill-based	Diversity	2.00	–0.24	–0.61 to 0.13	0.217	2.23	–0.20	–0.66 to 0.26	0.403
	Intensity	0.99	–0.07	–0.22 to 0.08	0.369	0.89	0.02	–0.17 to 0.21	0.860
	Frequency	4.37	–0.09	–0.40 to 0.22	0.552	3.66	0.26	–0.16 to 0.68	0.244
	Enjoyment	4.31	–0.05	–0.28 to 0.18	0.662	4.43	0.22	–0.02 to 0.46	0.091

	Preference	2.00	–0.02	–0.12 to 0.08	0.666	2.10	–0.17	–0.38 to 0.04	0.131
Self-improvement	Diversity	5.41	–0.13	–0.50 to 0.24	0.507	2.93	0.17	–0.53 to 0.87	0.642
	Intensity	2.68	–0.09	–0.26 to 0.08	0.275	1.37	–0.01	–0.30 to 0.28	0.949
	Frequency	4.90	–0.01	–0.21 to 0.19	0.937	4.43	0.01	–0.48 to 0.50	0.967
	Enjoyment[a]	3.31	–0.01	–0.16 to 0.14	0.934	3.39	–0.62	–1.02 to –0.22	0.006
	Preference	1.90	–0.03	–0.12 to 0.06	0.543	1.83	0.11	–0.07 to 0.29	0.264

[a]Analysis of between-group differences identified statistically significant differences between the groups for enjoyment of self-improvement activities (p=0.002); no other between-group differences were identified. [b]95% CI=95% confidence intervals for the β-coefficient. The constant has been calculated for the average age of participants at the time of assessment throughout the study period and therefore provides the value of the fitted regression line at x=13 years 9 months. β-coeff=β-coefficient, indicates the average degree of change over time, for example a β-coefficient of –0.33 for recreational diversity would mean that overall participants experienced a decrease in one recreational activity every 3 years. The 95% CI of the β-coefficient provide estimates of precision for the change over time. Interpretation of slope values is influenced by the measurement scale and maximum score of the Dimension scale: Diversity: min score=0, max score=10–13; Intensity=0–7; Frequency=0–7; Enjoyment=1–5; Preferences=1–3.

Table IV: Changes in participation at the second transition: leaving school (*n*=30)

Activity type	Dimensions	Constant	β-coeff	95% CI[a]	*p*-value
Recreational	Diversity	5.88	–0.19	–0.72 to 0.34	0.493
	Intensity	2.51	–0.04	–0.32 to 0.24	0.770
	Frequency	5.23	0.03	–0.30 to 0.36	0.844
	Enjoyment	4.10	<0.01	–0.16 to 0.16	0.991
	Preference	2.07	–0.01	–0.10 to 0.08	0.838
Active Physical	Diversity	2.60	–0.13	–0.61 to 0.35	0.590
	Intensity	0.97	0.02	–0.18 to 0.22	0.864
	Frequency	4.30	–0.07	–0.62 to 0.48	0.804
	Enjoyment	4.22	0.02	–0.23 to 0.27	0.871
	Preference	1.94	<–0.01	–0.09 to 0.09	0.952
Social	Diversity	7.73	0.07	–0.48 to 0.62	0.793
	Intensity	3.14	0.16	–0.10 to 0.42	0.229
	Frequency	4.09	0.25	0.08 to 0.42	0.008
	Enjoyment	4.24	0.19	0.06 to 0.32	0.007
	Preference	2.60	0.04	–0.03 to 0.11	0.296
Skill-based	Diversity	2.32	0.13	–0.27 to 0.53	0.524
	Intensity	1.09	0.10	–0.08 to 0.28	0.274
	Frequency	4.26	–0.48	–0.99 to 0.03	0.071
	Enjoyment	4.44	–0.17	–0.34 to <0.01	0.068
	Preference	2.00	0.02	–0.11 to 0.15	0.757
Self-improvement	Diversity	4.25	0.08	–0.55 to 0.71	0.798
	Intensity	2.03	0.02	–0.29 to 0.33	0.885
	Frequency	4.71	0.10	–0.26 to 0.46	0.585
	Enjoyment	3.52	0.15	–0.08 to 0.38	0.204
	Preference	1.79	0.03	–0.08 to 0.14	0.640

[a] 95% CI=95% confidence intervals for the β-coefficient. The constant has been calculated for the average age of participants at the time of assessment throughout the study period and therefore provides the value of the fitted regression line at x=13 years 9 months. β-coeff=β-coefficient, indicates the average degree of change over time, for example a β-coefficient of –0.33 for recreational diversity would mean that overall participants experienced a decrease in one recreational activity every 3 years. The 95% CI of the β-coefficient provides estimates of precision for the change over time. Interpretation of slope values is influenced by the

measurement scale and maximum score of the Dimension scale: Diversity: min score=0, max score =10–13; Intensity=0–7; Frequency=0–7; Enjoyment=1–5; Preferences=1–3.