Participation of children with cerebral palsy is influenced by where they live

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The study aimed to determine whether degree of participation of children with cerebral palsy (CP) is influenced by where they live, as predicted by the social model of disability. Ninety-two per cent children with CP resident in Northern England and born 1991–1996 were entered into the study. Participation was measured by the Lifestyle Assessment Score and its six component domain scores. Regression analysis was used to investigate variations in participation. There were 443 children (265 male, 178 female; mean age 4 years 8 months [SD 1 year 1 month] at time of assessment) in the study. In the regression analysis the following factors remained significant with regard to level of participation: type of CP (167 with hemiplegia, and of those remaining 240 with bilateral spasticity); intellectual impairment (105 with IQ<50, 113 with IQ 50 to 70, and 225 with IQ>70); presence of seizures (115 with active epilepsy); walking disability (114 unable to walk, 81 restricted and needing aids, 186 restricted but unaided, 62 unrestricted); communication problems (61 no formal communication, 51 use alternative formal methods, 126 some delay or difficulty, 205 no communication problems). After adjustment for these factors, there were significant variations with regard to level of participation in the Lifestyle Assessment Score by district of residence. The magnitude of these variations in Lifestyle Assessment Score between districts is similar to that accounted for by severe intellectual impairment. Similar models were obtained for four of the six domain scores. For one of these four, restriction of social interaction, the significant variation between districts was minimally influenced by the underlying type of CP, walking ability, or presence of seizures. Higher levels of participation among children with CP are associated with residence in certain districts. This is not attributable to variations in case-mix or functional capacity of the children. Participation of children with disability is partly a product of their environment.

The social model of disability, which is embodied in the new International Classification of Functioning, Disability and Health (World Health Organization 2001), regards disability as resulting from the interaction between individuals and their respective environments, rather than as something limited to the individual. The International Classification of Functioning, Disability and Health defines 'participation' as involvement in life situations, and proposes that the 'context' in which those with health impairments live will significantly influence the extent of their participation. This context consists partly of personal factors, such as personality and coping styles, and partly of the external physical, social, and attitudinal environment. This environment is classified by the International Classification of Functioning, Disability and Health, and efforts are being made to develop instruments with which to measure these environmental factors (Rosenbaum et al. 1986, Wallander et al. 1989, Imrie and Kumar 1998, Hemmingson and Borell 2002).

Preliminary analyses of data from a local questionnaire for parents of children with cerebral palsy (CP; Lowe et al. 2001) suggested that there were differences in participation of children with CP according to district of residence. We therefore undertook a larger study to test the hypothesis that the participation of children with disability is influenced by where they live.

For consistency, the phrase 'children with disability' is used rather than 'disabled children' throughout this (and the following) paper (Mihaylov 2004), but it is understood there are arguments for and against this nomenclature (Marks 1997, Mihaylov et al. 2004).

Method

THE REGISTER

The North of England Collaborative Cerebral Palsy Survey (1998) records details of all children with CP who are resident locally. Details of ascertainment methods for the The North of England Collaborative Cerebral Palsy Survey have been published previously (Jarvis and Hey 1984, Jarvis et al. 1985, Colver et al. 2000). About 100 children with CP are ascertained each year. The diagnosis and other attributes of these children is later confirmed at the age of 4 or 5 years. There are 38 000 births per year in the 6000 square mile catchment area of the survey; it has remote rural and densely populated urban areas which contain both pockets of severe social deprivation and of marked affluence. The area is served by 13 local authorities (10 metropolitan/unitary and 3 county) that are responsible for education, strategic planning, and social services, with further divisions of the rural counties to give a total of 27 separate public agencies for housing, local planning, transport, environmental health, and leisure services. Health services are provided by 15 National Health Service Trusts, each covering a district served by a convenor of The North of England Collaborative Cerebral Palsy Survey convenor.

MEASUREMENTS OF CHILDREN

Children born from 1991 to 1996 with CP who were resident in the area at the age of 4 or 5 years were included in this study. The following 13 items, recorded for each child and used in the analysis, are listed in a hierarchy of relative independence from the environment in which the children lived: type of CP (categorized as hemiplegia versus other), intellectual impairment, birthweight, presence of a postneonatal

cause, sex, year of birth, presence of epilepsy, severe hearing impairment, severe visual impairment, walking, upper limb function, communication difficulty, and feeding problems.

When comparing the participation of children in different places, it is important to adjust for case-mix variables, which represent children's fixed attributes, such as CP type, birthweight, intellectual impairment, and the presence of epilepsy. However, walking and upper limb function, communication, and feeding difficulties are attributes that reflect not only the severity of the children's original underlying impairment but also functional performance (International Classification of Functioning, Disability and Health = 'Activities'; World Health Organization 2001), which might be subject to local therapeutic effects. They might therefore act partly as case-mix variables and partly as path variables.

MEASURES OF PLACE

Three measures of place were used as separate descriptor variables: district of residence, allocation to a social deprivation quintile, and allocation to one of six categories of urbanization.

The districts of residence correspond to the geographical regions covered by 15 National Health Service Trusts (see Method).

Social deprivation quintile, allocated on the basis of the postcode of the current address of each child, uses the Townsend Score (Townsend et al. 1987) associated with the corresponding census enumeration district. The five bands contain equal proportions of the child population in the 1991 census from the catchment of The North of England Collaborative Cerebral Palsy Survey. The quintiles describe the extent of material deprivation or affluence of the small area (approximately 200 households) where the child lives in terms of car and house ownership, employment, and overcrowding.

A six-category urban/rural indicator for the ward of residence was obtained from the 1991 census, classifying each ward as wholly urban, predominantly urban, mixed urban, mixed rural, predominantly rural, or wholly rural (Office of National Statistics 2003).

These 13 child attributes and 3 place descriptors form the independent variables (Table I) used in the following analysis.

MEASURES OF PARTICIPATION

The participation of children was measured by using the Lifestyle Assessment Questionnaire, which is posted to parents to complete when their child is 4 or 5 years old (Mackie et al. 1998). The questionnaire generates a six-domain profile covering physical dependence, restriction of mobility, educational exclusion, restriction of social interaction, and the economic and clinical burdens on the child and family. This last domain represents the negative effects of being in receipt of public services, such as multiple appointments with professionals, negotiating bureaucracy, and the time-consuming effects of therapy, which can interfere with ordinary activities. An overall Lifestyle Assessment Score is derived from weighted aggregation of the six domain scores, by using weights derived from panel judgements about the severity of restriction in participation in each domain (Mackie et al. 2002). The Lifestyle Assessment Score and the domain scores were measured on scales from 0 to 100; increasing scores correspond to a reduction in participation. The six domain scores and the Lifestyle Assessment Score were used as dependent variables.

STATISTICAL ANALYSIS

Linear regression was used to relate the descriptors of the children with CP to these dependent variables. Stepwise regression techniques were used to determine the final models. The baseline score and the increments (with standard errors) at each level of the descriptors are reported for variables significant at $p < 0.05$. Residual analysis was performed to assess the goodness of fit of the models, with satisfactory results from normality plots, comparisons with fitted values, and consideration of outliers.

ETHICS

Permission was granted for the database to be maintained, and for any data analysis that did not require further family contact (provided that all reports were anonymized) to be carried out by Local Research Ethics Committees for all districts covered by the survey. Every family in this report completed the Lifestyle Assessment Questionnaire as part of the routine procedures of the survey. Informed consent was given by parents to be on the database and parents knew that research analyses would be undertaken.

Results

Parents of 476 living resident children born from 1991 to 1996 (92% of those eligible) with CP returned Lifestyle Assessment Questionnaires. Of these, 443 had complete data on the items required for analysis.

Two models were derived for each of the seven dependent variables. The Basic model explored elements of the children's demographic factors and clinical features of their CP, not taking account of the children's functional achievements. In the Extended model we added four elements (walking ability, upper limb function, communication, and feeding difficulties) in order to explore the extent to which functional status (as distinct from the standard clinical descriptors) could add to the prediction of participation.

The variables that made a significant contribution to each model are shown in Tables II and III. Some variables have no independent effect in predicting participation in neither the Basic nor Extended models and therefore do not appear in the

Table I: List of independent variables used in study

Nr	*Variable*	*Type*
1	Birthweight	Case-mix
2	Year of birth	Case-mix
3	Sex	Case-mix
4	Postneonatal	Case-mix
5	Cerebral palsy type	Case-mix
6	Intellectual impairment	Case-mix
7	Seizures	Case-mix
8	Vision level	Case-mix
9	Hearing level	Case-mix
10	Walking ability	Path
11	Upper limb function	Path
12	Communication	Path
13	Feeding difficulties	Path
14	District	Place
15	Social deprivation quintile	Place
16	Urbanization	Place

tables. These are birthweight, sex, hearing level, presence of a postneonatal cause for the CP, and residence in a place that is considered socially deprived or urbanized. Furthermore, once walking ability, communication, and feeding difficulties are taken into account in the Extended model, upper limb function no longer significantly influences participation. In contrast, several variables have pervasive effects on most types of participation. In both the Basic and the Extended model the type of CP, the degree of intellectual impairment, and the presence of epilepsy have powerful independent influences on participation scores. In the Extended models, walking ability, and communication difficulty have additional effects. Three more specific influences on participation were observed: year of birth had a significant influence on educational exclusion; degree of visual impairment affected mobility participation (Basic model); and feeding difficulties were associated with the extent of clinical burden (Extended model).

In Tables II and III, the first baseline row shows the dependent variable score when every contributing descriptor variable in the model is at its own baseline value. Thus, in the Basic model in Table II, when other descriptor variables are held constant, the increment in Lifestyle Assessment Score associated with having active epilepsy is 7.6 points. The equivalent increments for the remaining case-mix variables are 11.6 points associated with CP type and 18.7 points associated with variations in IQ. Within the individual participation domains, some of these effects are even larger. For instance, the difference in physical dependence score associated with increasing intellectual impairment is 28.6 points, and visual impairment increases restriction of mobility by nearly 10 points. In the Extended model (Table III), parts of the variation in Lifestyle Assessment Score are accounted for by walking ability (18 points for change from fully functional walking through to non-walking) and communication difficulty (5.4 to 5.6 points for any type of communication problem). In most cases the effect of increasing the severity of predictor variables is to decrease participation (i.e. to increase scores progressively). There are exceptions to this, such as communication problems,

Table II: Variable coefficients (standard errors) from Basic model

Variable	*Values*	*n*	*Basic model*						
			LAS	*Physical dependence*	*Restriction of mobility*	*Educational exclusion*	*Clinical burden*	*Economic burden*	*Restriction of social interaction*
Baseline			49.8 (3.5)	56.9 (5.2)	54.5 (1.4)	12.1 (4.7)	21.1 (0.8)	13.0 (3.9)	38.4 (4.5)
Cerebral palsy	0 – Other	276	*	*	*	*	*	*	*
type	1 – Hemiplegic	167	–11.6 (1.5)	–15.3 (2.2)	–15.8 (1.7)	–6.3 (1.8)	–3.1 (1.0)	–8.6 (1.6)	–4.8 (1.9)
Intellectual	1 – IQ≥70	225	*	*	*	*	*	*	*
impairment	2 – IQ 50–69	113	10.2 (1.6)	14.5 (2.4)	9.2 (2.0)	13.2 (2.0)	4.0 (1.1)	4.9 (1.8)	6.7 (2.1)
	3 – IQ < 50	105	18.7 (2.0)	28.6 (2.9)	17.9 (2.4)	11.9 (2.4)	7.5 (1.4)	9.1 (2.2)	7.8 (2.5)
Year of birth	1991	80				*			
	1992	83				–6.6 (2.6)			
	1993	93				–4.9 (2.6)			
	1994	73				–7.7 (2.8)			
	1995	56				–8.6 (3.0)			
	1996	58				–6.6 (2.9)			
Seizures	1 – no seizures or medication in past year	328	*	*	*	*	*	*	*
	2 – active epilepsy	115	7.6 (1.7)	10.2 (2.6)	6.6 (2.1)	5.0 (2.1)	9.1 (1.2)	3.9 (1.9)	6.1 (2.2)
Vision level	1 – not blind	420			*				
	2 – blind or no useful vision	23			9.5 (3.9)				
District	1	17	*	*		*		*	*
	2	20	6.3 (4.5)	7.7 (6.7)		21.1 (5.5)		8.6 (5.1)	3.2 (5.8)
	3	26	–9.4 (4.3)	–13.1 (6.4)		2.7 (5.3)		–5.3 (4.8)	–9.2 (5.5)
	4	26	–2.9 (4.3)	–3.6 (6.3)		5.5 (5.2)		1.2 (4.8)	–10.1 (5.5)
	5	23	0.3 (4.4)	1.5 (6.5)		9.3 (5.4)		3.4 (4.9)	–4.5 (5.6)
	6	37	–5.0 (4.0)	–11.6 (5.9)		8.4 (4.9)		12.5 (4.5)	–5.4 (5.1)
	7	19	–7.7 (4.6)	–12.2 (6.8)		4.2 (5.6)		0.1 (5.1)	–9.0 (5.9)
	8	37	–4.8 (4.0)	–6.4 (6.0)		6.4 (4.9)		0.6 (4.5)	–10.9 (5.2)
	9	34	–4.0 (4.1)	–9.6 (6.0)		8.8 (5.0)		4.7 (4.6)	–1.3 (5.2)
	10	50	1.4 (3.9)	–2.0 (5.7)		1.7 (4.7)		9.5 (4.3)	7.4 (5.0)
	11	19	–7.5 (4.6)	–13.4 (6.8)		6.0 (5.6)		11.2 (5.1)	–5.5 (5.9)
	12	38	–3.2 (4.0)	–3.8 (5.9)		0.8 (4.9)		–0.02 (4.5)	–4.9 (5.1)
	13	52	–0.7 (3.8)	–4.1 (5.7)		14.3 (4.7)		1.1 (4.3)	3.2 (4.9)
	14	33	4.1 (4.1)	5.9 (6.1)		8.4 (5.0)		9.1 (4.6)	–0.5 (5.3)
	15	12	–9.8 (5.2)	–13.1 (7.7)		2.9 (6.3)		–1.8 (5.8)	–10.1 (6.6)

Empty cells in table indicate independent variable was not significantly related to dependent variable. *Baseline, baseline against which the other levels of variable are compared. LAS, Lifestyle Assessment Score.

which have opposite effects on differing participation domains.

In terms of the main hypothesis, the effect of place of residence on participation levels was confirmed. There were significant district-level variations in overall participation after the influence of case-mix variables had been allowed for. It is notable that the 16-point variation in the Lifestyle Assessment

Table III: Variable coefficients (standard errors) from Extended model

Variable	*Values*	*n*	*Extended model*						
			LAS	*Physical dependence*	*Restriction of mobility*	*Educational exclusion*	*Clinical burden*	*Economic burden*	*Restriction of social interaction*
Baseline			42.0 (3.8)	42.8 (5.5)	45.7 (2.4)	4.2 (4.9)	16.7 (1.2)	13.2 (3.9)	38.4 (4.5)
Cerebral palsy type	0 – Other	276	*	*	*			*	*
	1 – Hemiplegic	167	–5.6 (1.6)	–5.5 (2.3)	–7.0 (1.8)			–7.2 (1.7)	–4.8 (1.9)
Intellectual impairment	1 – IQ≥70	225	*	*	*	*	*		*
	2 – IQ 50–69	113	4.7 (1.8)	5.6 (2.6)	5.7 (1.8)	7.8 (2.3)	3.8 (1.1)		6.7 (2.1)
	3 – IQ<50	105	7.1 (2.7)	10.2 (3.8)	7.0 (2.4)	5.5 (3.3)	6.0 (1.6)		7.8 (2.5)
Year of birth	1991	80							
	1992	83				–5.4 (2.6)			
	1993	93				–4.5 (2.5)			
	1994	73				–7.0 (2.7)			
	1995	56				–8.2 (2.9)			
	1996	58				–6.3 (2.8)			
Seizures	1 – no seizures or medication in past year	328	*	*	*		*		*
	2 – active epilepsy	115	5.1 (1.7)	7.0 (2.4)	3.8 (1.9)		8.4 (1.2)		6.1 (2.2)
Walking	1 – no functional consequences	62	*	*	*	*	*		
	2 – walking restricted but unaided	186	2.6 (2.0)	5.0 (2.8)	1.4 (2.2)	3.8 (2.5)	2.6 (1.4)		
	3 – walking limited and needs aids	81	9.3 (2.4)	15.6 (3.5)	13.2 (2.8)	11.8 (2.9)	7.0 (1.6)		
	4 – unable to walk	114	18 (3.0)	28.9 (4.3)	27.9 (3.1)	11.7 (3.5)	4.6 (1.9)		
Communication	1 – no problem	205	*	*		*		*	
	2 – problem but communicates with speech	126	5.6 (1.8)	8.4 (2.6)		8.5 (2.3)		5.8 (1.8)	
	3 – needs alternative formal methods	51	5.6 (2.7)	13.8 (3.9)		7.3 (3.5)		6.8 (2.5)	
	4 – no formal communication	61	5.4 (3.5)	6.7 (5.1)		7.1 (4.4)		16.9 (2.4)	
Feeding difficulties	1 – no problem	348					*		
	2 – fed orally but has oromotor difficulty	74					–0.6 (1.5)		
	3 – not fed orally	21					8.8 (2.5)		
District	1	17	*	*		*		*	*
	2	20	1.5 (4.3)	0.4 (6.2)		16.8 (5.5)		6.1 (5.1)	3.2 (5.8)
	3	26	–8.4 (4.0)	–11.8 (5.9)		0.3 (5.1)		–5.4 (4.7)	–9.2 (5.5)
	4	26	–2.2 (4.0)	–2.3 (5.8)		4.1 (5.1)		–0.3 (4.7)	–10.1 (5.5)
	5	23	0.7 (4.1)	3.6 (6.0)		9.1 (5.3)		2.0 (4.8)	–4.5 (5.6)
	6	37	–6.5 (3.7)	–13.5 (5.4)		5.2 (4.8)		11.3 (4.4)	–5.4 (5.1)
	7	19	–4.2 (4.3)	–6.1 (6.2)		5.3 (5.5)		1.5 (5.1)	–9.0 (5.9)
	8	37	–5.2 (3.8)	–6.0 (5.4)		4.5 (4.8)		–0.6 (4.4)	–10.9 (5.2)
	9	34	–3.4 (3.8)	–8.0 (5.5)		7.3 (4.8)		4.1 (4.5)	–1.3 (5.2)
	10	50	1.6 (3.6)	–0.8 (5.3)		0.1 (4.6)		7.6 (4.3)	7.4 (5.0)
	11	19	–6.1 (4.3)	–11.0 (6.2)		5.2 (5.5)		10.4 (5.1)	–5.5 (5.9)
	12	38	–3.1 (3.8)	–2.3 (5.5)		–1.3 (4.8)		–2.0 (4.4)	–4.9 (5.1)
	13	52	–0.8 (3.6)	–3.7 (5.2)		12.4 (4.6)		–0.4 (4.2)	3.2 (4.9)
	14	33	1.7 (3.8)	2.6 (5.6)		5.0 (4.9)		8.3 (4.5)	–0.5 (5.3)
	15	12	–6.9 (4.8)	–7.4 (7.0)		4.0 (6.2)		–1.3 (5.7)	–10.1 (6.6)

Empty cells in table indicate independent variable was not significantly related to dependent variable. *Baseline, baseline against which other levels of the variable are compared. LAS, Lifestyle Assessment Score.

Score in the Basic model (Table II) between children living in the most deprived and best districts almost matched the 18.7 point difference associated with severe intellectual impairment. Such variations remained when potential path variables were introduced into the Extended model. These district effects were also evident across four of the six participation domains.

Further effects of location are illustrated in Figure 1a–e, in which districts are ordered by decreasing overall participation

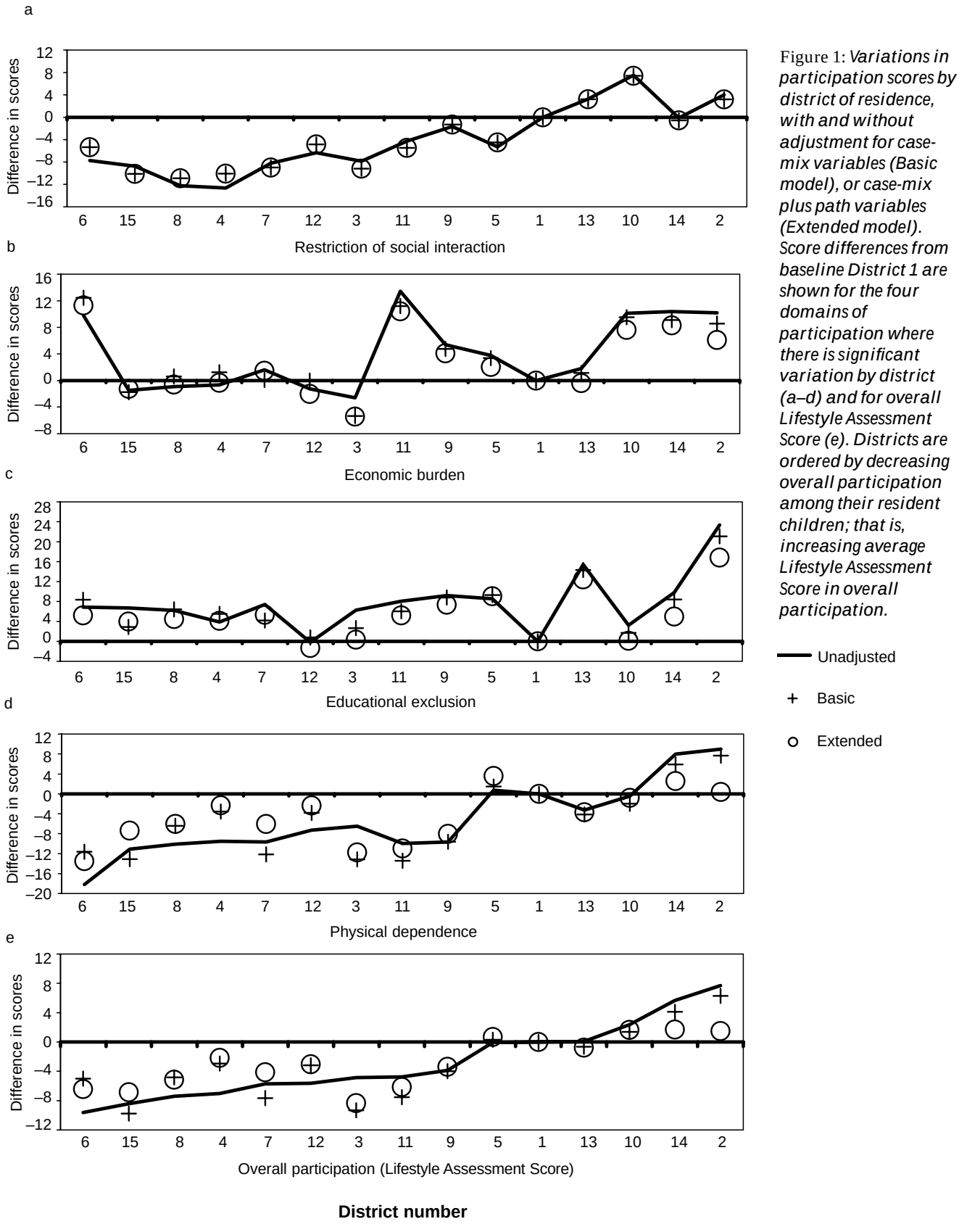

Figure 1: *Variations in participation scores by district of residence, with and without adjustment for case-mix variables (Basic model), or case-mix plus path variables (Extended model). Score differences from baseline District 1 are shown for the four domains of participation where there is significant variation by district (a–d) and for overall Lifestyle Assessment Score (e). Districts are ordered by decreasing overall participation among their resident children; that is, increasing average Lifestyle Assessment Score in overall participation.*

among their resident children; that is, increasing average Lifestyle Assessment Score in overall participation (Fig. 1e). The ordering is by unadjusted score differences in relation to the baseline for District 1. Figure 1e illustrates the changes to this crude univariate effect when the scores are adjusted in the Basic and Extended regression models; thus, District 15 has a value of –9.8 relative to District 1, and District 2 has a value of +6.3 relative to District 1. The maximum variation in Lifestyle Assessment Score when path variables are introduced in the Extended model falls to 10 points (Fig. 1e: District 14 versus District 3). Figure 1e also shows that there is considerable difference in the case-mix of children with CP between districts; for example, District 3 must have proportionately more children with severe CP because the adjustment moves the average Lifestyle Assessment Score to a lower point. There are also districts where relatively poor walking ability and/or communication problems of children with CP explains a good deal of the reduced participation of those children, for example, in District 2 the Lifestyle Assessment Score value in the Extended model is considerably different from that in the Basic model.

Figures 1a–d show the effects of district of residence on the four of six domain scores (components of the Lifestyle Assessment Score) for which there is a statistically significant effect of place: restriction of social interaction; economic burden; educational exclusion; and physical dependence. Here it is notable that some districts, such as District 2, consistently appear with relatively high scores but there are others where particular domains show contrasting low scores, such as educational exclusion in District 10. A further striking finding is that restriction of social interaction shows hardly any difference between the unadjusted scores and the two adjusted models; in other words, case-mix variables, such as underlying type of CP and path variables such as walking ability, explain hardly any of the 20 point difference between districts.

Discussion

These results provide support for the social model of disability, because the participation of children with similar types and severity of CP varies according to where they live. Environmental factors have an important role, one that can be as influential as type of CP, degree of intellectual impairment, or even very restricted walking ability in determining what children actually do. Variation in the domain of social exclusion seems to be explained entirely by where children live and not to be influenced by the underlying type of CP, for example. There is also evidence for specificity of environmental effects on participation, first in the sense that a particular district might facilitate some participation domains and restrict others, and second from the observation that educational participation has improved during a period of policy commitment to educational inclusion.

Little has been published on the determinants of participation in children with CP. Beckung and Hagberg (2002) showed that, among 176 5- to 8-year-olds with CP, participation restrictions in the domains of mobility, education, and social relationships were strongly influenced by activity limitation as measured by the Gross Motor Function Classification System (Palisano et al. 1997) and by learning disability.* Additional neuroimpairments, such as epilepsy, vision problems, and hydrocephalus, had pervasive effects largely mediated through activity and learning. These variables correspond closely to our significant case-mix and path variables. However, these authors did not describe how participation varied with place or with other environmental factors. Other studies have concentrated on the influence of specific environmental factors. Simeonsson et al. (2001) have shown that the participation of pupils with disabilities in important learning activities can be related to several specific facilitatory characteristics of schools. Another study (Bottos et al. 2001) showed that levels of independence among children with CP improved significantly after the provision of powered wheelchairs. However, such literature is constrained by the lack of instruments to measure participation and the relevant characteristics of a child's environment.

We have some reservations about the instrument used to measure participation: the dependent variable. This variable might not cover all relevant domains such as behavioural exclusion, it uses the proxies 'attends special school' and 'how long to get to school' to represent educational exclusion, and it includes some measures of sibling and parent participation. Nevertheless, it is based on extensive studies of life circumstances of children with CP and their families (Jarvis and Hey 1984) and, to our knowledge, is the only measure with specific relevance to CP.

We also have reservations about the extent to which we were able to represent important intrinsic differences between children in terms of case-mix and personal factors. We had no data on personal coping styles and aspirations. The underlying severity of motor incapacity might have been better represented by a scale such as the Gross Motor Function Classification System (Palisano et al. 1997). However, we contend that our Extended model (including functional deficits in walking, upper limb activities, communications and feeding) took much of this variation between children into account. There is the further possibility of interactions between the path variables and district of residence, but there would have been insufficient statistical power to be confident about the interpretation of such complex analyses.

There are potential practical applications for the types of data and analysis we have presented. One application could be to examine the participation profiles of individual children, and to relate these to the extent of participation achieved in the 'best' district according to the model with a particular child's case-mix characteristics. Where a child's participation falls far below what seems to be achievable, we suggest that this could generate a multi-disciplinary meeting of specialists with parent(s) and child, with the aim of seeking adjustments to that child's environment to maximize participation. Crucially, the child and parents would be asked what they perceived as the barriers to participation; and solutions would be sought in the educational, social, housing and benefit sectors as well as the therapeutic sectors. Another application would be for a district to compare its average participation scores across the six domains with those in other districts. This might show a striking reduction in participation across one or more domains that could plausibly be linked to a shortfall in a specific service, policy, or managerial structure.

The intriguing part of our study is that it cannot explain the significant variations in participation any further because of the crudeness of the environmental descriptors. Districts used correspond in the main to the areas covered by the public agencies which have responsibilities for services for children with such disabilities. It might be expected that the

*US usage: mental retardation.

environment in a district will be homogeneous for issues such as housing, education, health, transport, and social services, but there is little comparative information about the quality or extent of relevant public services. For the social and attitudinal environments, not only is there no comparative information but the relevant geographical area might be very different and at a different scale.

We have shown that, prima facie, there is a case which suggests that variations between localities are associated with differences in the participation of their resident children with CP. We now need to identify and measure which elements of these environments are crucial to this process. In the following article (Mihaylov et al. 2004) we discuss how this might be undertaken.

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