INTERNATIONAL JOURNAL OF INCLUSIVE EDUCATION
https://doi.org/10.1080/13603116.2020.1807625

School placement and participation of Chilean young people with cerebral palsy

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ABSTRACT

People with Cerebral Palsy (CP) face barriers to participate in social and educational environments. This study focuses on the contribution of school placement, controlling by motor functionality and receptive vocabulary, over several domains of participation. A cross-sectional study was conducted with 123 preadolescents and adolescents with CP, from both special and regular school systems of Chile. A quantitative approach was employed using standardised instruments (i.e. Life habits questionnaire, Gross Motor Function Classification System – Expanded and Revised, and Picture Vocabulary Test – Revised). Results suggest that preadolescents' participation is significantly predicted by motor functionality and receptive language in all domains of participation, but for interpersonal relationship and community. For adolescents, school placement explained a significant amount of the variance for mobility, responsibility, and community participation, besides the variability explained by motor functionality and receptive language. Attending special schools exerts a negative influence on some participation domains, including mobility, responsibility, community life and recreation. Our findings support the importance of considering inclusive educational programmes as a critical aspect to improve wellbeing of people with CP, while also furthering their rights of participation.

ARTICLE HISTORY
Received 18 April 2020
Accepted 5 August 2020

KEYWORDS
Cerebral palsy; school placement; participation; adolescents; motor functionality; receptive language

Introduction

The International Classification of Functioning, Disability and Health (ICF) framework of the World Health Organization stresses participation as a crucial element of people's functioning, health, and quality of life. The ICF defines participation as an individual's involvement in life situations that is influenced by health conditions, body functions and structures, activities, and contextual factors (WHO 2001). Coster and Khetani (2008) conceptualise and relate these constructs, defining *activities* in terms of simple and specific tasks performed by individuals, whereas *life situations* as sequences of required activities to accomplish a goal, either personally or socially meaningful, which are associated with

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specific settings. Therefore, *participation* can be paraphrased as the involvement in life situations.

Participation in everyday life provides opportunities for both preadolescents (9–12) and adolescents (early, middle and late adolescents 13–21) to develop physical, cognitive, and communication skills, allowing them to establish social relationships, and fostering adaptive behaviours (Rogoff 2003). However, participation may become difficult for people with disabilities, such as neurological and developmental conditions. Such disabilities constitute higher barriers to those people aiming to participate in social and educational environments (Tan et al. 2016), mainly due to the physical constraints of CP that often limit their mobility and interfere with their autonomy (Bonnechere et al. 2017).

Furthermore, it has been reported that children with CP experience implicit and explicit forms of exclusion, varying from lack of awareness of their disability, to verbal and physical bullying (Lindsay and McPherson 2012). It has also been reported that a high proportion of children with CP could not be involved in their preferred physical and social activities, given physical and communication impairments (Imms et al. 2017). Moreover, at working age, people with CP face lower employment opportunities, and lower employment rates than their peers without this condition (Benner et al. 2017).

Regarding those variables that influence participation, longitudinal studies mention age, intellectual impairment, level of gross motor function, and communication skills as the primary factors associated with participation of people with CP (Tan et al. 2014, 2016; Vos et al. 2014). In addition, Humphry (2002) states that participation is impelled not only by maturational and developmental changes within the person, but also by the sociocultural environments in which disabled people live. Participation patterns also seem to be influenced by children's interests, environmental opportunities, and exposure to activities (Wiseman, Davis, and Polatajko 2005). Therefore, different social contexts and cultural expectations can thus exert some degree of influence in participation patterns (Law 2002). For instance, Engel-Yeger, Jarus, and Law (2007) report that culture might have a significant effect on children's participation in the community. Similarly, Chiarello et al. (2010) observe that both parents of children with CP and youth with CP placed more priority on promoting daily activities and self-care than on leisure pursuits, such as recreation and socialisation.

Likewise, school placement (i.e. special or regular [mainstream] school systems) has also shown some effect on students' participation at school. For example, students with disabilities reported having more interaction with their peers in regular classrooms, compared to those interactions occurring in special classrooms (Baker and Donnelly 2001). This suggests that special education negatively affects students' social participation (e.g. Kennedy, Shukla & Fryxell,1997; Wendelborg and Tøssebro 2008). Regarding participation within regular schools, Wendelborg and Tøssebro (2011) found that having an intellectual disability is a stronger predictor of weekly hours of special education than the severity of the impairment, whereas the latter is the strongest predictor of weekly hours of assistant support. Both hours of special education outside the classroom and hours with assistant support of a teacher within the classroom harm participation of students with a disability. However, the influence of different educational placements on participation has not been widely studied for students with CP (Kang et al. 2010; Finnvold 2018).

As Finnvold (2018) points out, few studies have examined the associations between social participation and the degree of inclusion in regular schools, after accounting for

the individual characteristics of disabled students. To the best of our knowledge, there are no published studies examining the impact of school placement (i.e. regular or special schools) on the level of participation of both preadolescents and adolescents with CP. The latter may be due to the fact that, in most countries, special education has been progressively eradicated as an educational alternative, making school placement analysis difficult. According to the WHO (2011), only 2.3% of students are educated in special schools across European countries, which is a trend among most countries belonging to organisations for economic cooperation and development, and also in developing ones.

Therefore, the present study aims at describing and analysing the contribution of motor functionality, receptive vocabulary and school placement over different participation domains of students with CP. We expect to observe positive correlations between both motor functionality and receptive vocabulary with participation in different domains. Likewise, we hypothesise a positive correlation between students' participation levels and their attendance in the regular school system. Finally, we expect that all the above-mentioned variables will contribute to predict CP students' participation, although differences may be attributable to school placement. A better understanding of the association between mobility, communication, and school placement and CP students' participation is critical to promote interventions that consider participation as a critical aspect of rehabilitation and inclusion. The latter may be especially crucial for countries that still have special education systems as an alternative of education, as is the case of Chile.

Methods

The present study was conducted under a quantitative approach in which the phenomenon under study is represented and measured by numerical variables (Lewin 2005). Consequently, we implemented inferential statistical analyses to test our hypotheses regarding the association between variables and their predictive capacity on social participation.

Design and participants

This study implemented a cross-sectional design encompassing 123 preadolescents and adolescents with CP (preadolescents $N = 57$ (46.3%), $M_{age} = 11$ y 4mo, SD = 1y 4mo, range: 9–13 years; adolescents $N = 66$ (53.7%), $M_{age} = 16$y 6mo, SD = 1y 9mo, range: 14–21 years) from both special and regular schools in Chile. There were no statistically significant differences in the proportions of males and females within the preadolescent and adolescent groups ($\chi^2(1) = .004$; $p = .95$). Students diagnosed with CP were sampled by means of a non-probability convenience sampling from 50 regular and 72 special schools in three regions of Chile.

Variables and instruments

Life habits questionnaire (LIFE-H)

This instrument collects information on all life habits that people carry out in their environment (i.e. home, workplace or school, neighbourhood) to ensure their survival and development in society throughout their lifetime (Fougeyrollas et al. 1998; Noreau, Fougeyrollas, and Vincent 2002). It measure activities – *life habits dimension*- in terms

of simple and specific tasks performed by individuals (domains of nutrition, fitness, personal care, communication, housing, and mobility) and involvement in life situations – *social role dimension*- structured from sequences of required activities to accomplish goals that are associated with specific settings (domains of responsibilities, interpersonal relationships, community life, education, employment, and recreation).

The instrument has a version for children (short form 5–13 years, LIFE-H 1.0) and one for adolescents and adults (general short form 14–99 years, LIFE-H 3.1). These versions are composed of 64 and 77 items, respectively. Special educators, parents or young people themselves can answer the questionnaire. Data analysis of the LIFE-H outcomes uses weighted scale scores, which vary from 0 to 9, where 0 indicates total dependency and 9 represents activities or roles that are performed without difficulty or assistance (Noreau, Fougeyrollas, and Vincent 2002).

The questionnaire has shown moderate to high intra-rater and inter-rater reliability for all domains, with intraclass correlation coefficients ranging from .58 to .95, and from .63 to .93, respectively. The LIFE-H has proved to be useful to assess different populations with disabilities such as CP, spina bifida, acquired brain injury, and developmental delay, among others (Noreau et al. 2007). Two studies suggest that the LIFE-H assess participation domains, as defined by the ICF research branch, making it a useful measure of participation in individuals with CP (see Sakzewski, Boyd, and Ziviani 2007; Chien et al. 2014). Regarding its psychometric properties, Santamaría, Camden, and Fonseca (2013) reported adequate validity indices for Latin American populations, and Pérez-Salas et al. (2019) reported adequate internal consistency indices ($\Omega = .94$ for life habits dimension and y $\Omega = .90$ for social role dimension), and a general factor that explained 69.5% of variance in a sample of Chilean people with CP.

Gross motor function classification system – expanded and revised (GMFCS-E&R)

This classification system describes the motor performance of people with CP based on their functional abilities, needs for assistive technology, and wheeled mobility (Palisano et al. 2007). Functional levels range from I (i.e. independent gross motor function with few limitations) to V (i.e. complete dependence for all gross motor activities). The GMFCS has demonstrated to be valid, reliable and stable over time (Palisano et al. 2006), and does not require specialised training to be reliably administered (Palisano et al. 2007).

Test de Vocabulario en imágenes- Revisado (picture vocabulary test-revised) (TEVI-R).

This test evaluates receptive vocabulary for Spanish speakers. The TEVI-R consists of 116 sheets with their corresponding words, and it has two equivalent forms (Echeverría, Herrera, and Segure 2002). It is similar to the Peabody Picture Vocabulary Test (Dunn and Dunn 1981), and it was developed in Chile with a contextualised vocabulary, with updated population norms (Echeverría, Herrera, and Segure 2002). The TEVI-R has a reliability index of $KR_{20} = .98$ for both forms. The validation process was conducted in Concepción (Chile) in a sample of 1040 participants (Echeverría, Herrera, and Segure 2002), and it has been used to assess receptive language in children with CP (Pérez-Salas 2010).

Procedure

Participants were contacted through their schools and invited via telephone to participate in the study. The evaluation of the participants was individual, conducted in 1–2 sessions of 30 minutes each, and took place in their schools, in specially conditioned rooms to perform the evaluations. Informed consent was obtained from their parents, whereas participant assent was obtained in the presence of a third person who ensured the willingness of the participant to collaborate with the study. All participants received a small incentive for participating in the study (i.e. a five US dollar gift) that met the ethical criteria of the APA Ethics Code (i.e. Standard 8.06; American Psychological Association 2016). Participant's rights to privacy, confidentiality, anonymity and to withdraw from the study at any time were also guaranteed. This study was approved by the Research Ethics Committee of Universidad de Concepción, Chile.

Although some of the participants with CP were able to answer the LIFE-H scale by themselves, we asked their special educators to evaluate their level of participation in order to have equivalent raters for the whole sample. Two specially trained psychologists conducted all the evaluations. The degree of motor impairment was established using the GMFCS-E & R and confirmed by the occupational or physical therapist of each school.

Data analysis

Descriptive statistics and correlations were used to both characterise the sample and to estimate the degree of association among the variables of interest. Hierarchical linear regressions were done to estimate the contribution of motor functionality, receptive language, and school placement to participation in LIFE-H social roles domains Assumptions for parametric inference were tested.

Since motor functionality (GMFCS-E&R) is measured as a categorical variable, this score was converted into a dummy variable to allow its analysis. All analyses were conducted using SPSS IBM v.19. We did not conduct any replacement procedure for missing data. Pairwise deletion method was used to handle missing values.

Results

In terms of communication skills, 54 participants (43.9%) interacted verbally, 53 interacted with vocalizations (43.1%), 13 communicated with head movements (10.6%), one with an eye-gaze indication (0.8%), one with pictograms (0.8%), and one with signs (0.8%).

Descriptive information of GMFCS-E&R, school placement, gender, age, motor and intellectual diagnosis are presented for 123 participants with CP in Table 1 for preadolescents and in Table 2 for adolescents.

As shown in Tables 1 and 2, the sample included people with a functional performance from level I (most able) to level V (least able).

Regarding motor function, eighty-five percent of preadolescent special school students were classified in GMFCS-E & R Level V (less able), in contrast to 0% observed in regular school students. The majority of preadolescent students in regular school (80%) were in GMFCS-E&R Level I (most able). In terms of diagnosis, most of preadolescent participants

Table 1. Characteristics of preadolescents with cerebral palsy.

School placement		*N*(%)	Female	Male	Age *M*(SD)	Hemiplegia	Diplegia	Quadriplegia	Other/not given	Intellectual disability (%)
Special school		32(56%)	13	19	11.25(1.52)	6(19%)	7(22%)	13(40%)	6(19%)	31(97%)
GMFCS	I	3(9%)	1	2	10.67(0.33)	2	1	0	0	3(100%)
	II	2(6%)	0	2	9.0(0.0)	2	0	0	0	2(100%)
	III	0(0%)	0	0	–	–	–	–	–	–
	IV	0(0%)	0	0	–	–	–	–	–	–
	V	27(85%)	12	15	11.48(0.29)	2	6	13	6	26(96%)
Regular School		25(44%)	10	15	11.68(1.11)	12(48%)	3(12%)	0	10(40%)	12(48%)
GMFCS	I	20(80%)	8	12	11.60(0.26)	11	1	0	8	8(40%)
	II	2(8%)	1	1	12.50(0.50)	0	0	0	2	1(50%)
	III	2(8%)	1	1	11.0(0.00)	1	1	0	0	2(100%)
	IV	1(4%)	0	1	13(--)	0	1	0	0	1(100%)
	V	0(0%)	0	0	–	–	–	–	–	–
Total		57	23	34	11.44(1.36)	18(32%)	10(17%)	13(23%)	16(28%)	43(75%)

Level I, most able; Level V, least able; GMFCS, Gross Motor Function Classification System.

Table 2. Characteristics of adolescents with cerebral palsy.

School placement		*N*(%)	Female	Male	Age *M*(SD)	Hemiplegia	Diplegia	Quadriplegia	Other/not given	Intellectual disability (%)
Special school		40(61%)	14	26	16.85(1.29)	11(27%)	8(20%)	8(20%)	13(33%)	35(87.5%)
GMFCS	I	8(20%)	3	5	17.75(1.39)	3	0	1	4	6(75%)
	II	7(17.5%)	5	2	16.86(1.57)	2	2	1	2	6(85.71%)
	III	3(7.5%)	0	3	17.67(0.58)	1	1	0	1	3(100%)
	IV	2(5%)	1	1	16.5(2.12)	1	0	0	1	2(100%)
	V	20(50%)	5	15	16.33(1.02)	4	5	6	5	18(90%)
Regular School		25(38%)	12	13	15.92(1.58)	10(40%)	4(16%)	3(12%)	8(32%)	8(32%)
GMFCS	I	16(64%)	9	7	15.69(1.25)	8	2	0	6	3(18.75%)
	II	7(28%)	3	4	16.71(2.22)	2	2	1	2	4(57.14%)
	III	1(4%)	0	1	15(--)	0	0	1	0	1(100%)
	IV	0(0%)	0	0	–	–	–	–	–	–
	V	1(4%)	0	1	15(--)	0	0	1	0	0(0%)
Non-attendance		1(1%)	1	0	15	1(100%)	0	0	0	1(100%)
GMFCS	I	–	–	–	–	–	–	–	–	
	II	1	0	0	15	1	0	0	0	1(100%)
	III	–	–	–	–	–	–	–	–	
	IV	–	–	–	–	–	–	–	–	
	V	–	–	–	–	–	–	–	–	
Total		66	27	39	16.47(1.47)	22(33%)	12(18%)	11(17%)	21(32%)	44(67%)

Level I, most able; Level V, least able; GMFCS, Gross Motor Function Classification System.

studying at special schools had a quadriplegia condition (40%) and almost all of them had intellectual disability (97%). On the other hand, most of the preadolescent participants studying in the regular school system had hemiplegia condition (48%), none of them had quadriplegia, and only 48% had intellectual disability.

For the adolescent sample, fifty percent of students attending special school were classified in GMFCS-E & R Level V (less able), in contrast to 4% observed in regular school students. The majority of adolescent students in regular school (64%) were in GMFCS-E&R Level I (most able). In terms of diagnosis, most of the adolescent participants studying at special schools had other/not given condition (33%) or hemiplegia condition (27%) and the majority of the sample 87.5% had intellectual disability. In the same way, most of the adolescent participants studying in the regular school system had hemiplegia condition (40%) or other/not given condition (32%), however only 32% of them had intellectual disability.

Table 3 shows LIFE-H participation levels in twelve domains, ordered by GMFCS-E&R levels for preadolescents and adolescents, where higher scores reflect more participation in the related activity. In the case of preadolescents showed strong inverse associations between GMFCS-E&R and housing, personal care, and community life in comparison to the remaining domains. On the other hand, adolescents evidenced strong inverse associations of GMFCS-E&R levels with less capacity for personal care and lower participation in recreational activities.

As data were not normally distributed, and GMFCS-E&R is an ordinal scale, Spearman correlations (i.e. rho) were calculated between each participation domain and both motor classification levels and receptive vocabulary (Table 4).

Finally, we conducted hierarchical regressions to assess the contribution of motor functionality, receptive language, and school placement (special education vs. regular education) to participation in LIFE-H social roles domains, for preadolescents (Table 5) and adolescents, respectively (Table 6). Motor functionality was converted in a dummy variable to allow this analysis. Model 1 includes dummy variables for motor functionality (GMFCS-E&R). Model 2 includes receptive language score (TEVI-R), and Model 3 incorporates school placement.

As shown in Table 5, preadolescents' participation was significantly predicted by both motor functionality and receptive language in all domains, but for interpersonal relations and community domains, where motor functionality was found to be the only significant predictor. School placement did not predict participation in any domain, beyond the amount of variance explained by the other predictors.

In the case of adolescents' participation (Table 6), the same analysis showed that school placement significantly predicts mobility, responsibility, and community domains, explaining between 6.9% and 17.8% of the variance, above the prior variability explained by motor functionality and receptive language. For the case of recreation, both motor functionality and school placement education significantly predicted students' levels of participation. In this case, the school placement explained a 6.5% of the variance, above the variance previously explained by motor functionality (47.7%). Finally, employment and education were predicted only by motor functionality and receptive language, whereas no predictor appears to be significant for predicting interpersonal relationships.

To reach a better understanding of the contribution of school placement over the different participation domains, we compared their participation levels in social roles

Table 3. Mean participation scores of preadolescents and adolescents among GMFCS-E&R levels.

		GMFCS-E&R				
Participation (LIFE-H)	Sample	I	II	III	IV	V
Nutrition	Preadolescent	9.35(1.24)	8.40(1.85)	8.70(.26)	10(--)	5.46(2.45)
	Adolescent	8.90(1.4)	8.80(1.31)	6.76(1.14)	4.58(2.16)	5.57(2.79)
Fitness	Preadolescent	8.76(1.46)	7.80(2.25)	7.59(.26)	3.33(--)	5.24(1.98)
	Adolescent	9.01(1.29)	7.95(1.45)	4.26(1.40)	5.37(2.88)	5.38(2.40)
Personal Care	Preadolescent	8.35(2.07)	6.55(2.79)	6.18(1.08)	4.29(--)	3.31(2.07)
	Adolescent	8.65(1.31)	6.06(2.51)	4.78(1.81)	4.72(1.96)	3.68(2.57)
Communication	Preadolescent	8.70(1.33)	7.72(2.98)	8.31(1.21)	9.05(--)	5.42(2.45)
	Adolescent	8.75(1.50)	7.68(2.03)	5.15(1.88)	6.67(4.71)	5.49(2.11)
Housing	Preadolescent	9.40(1.05)	7.99(2.00)	7.22(.79)	6.30(--)	3.31(2.32)
	Adolescent	9.14(1.40)	7.16(2.39)	7.33(.59)	5.42(2.95)	5.34(3.09)
Mobility	Preadolescent	8.48(2.38)	6.30(2.18)	5.83(1.96)	3.33(--)	4.09(2.13)
	Adolescent	8.19(2.29)	6.12(2.80)	3.41(1.86)	5.00(2.36)	4.43(2.47)
Responsibilities	Preadolescent	8.54(2.00)	7.22(3.21)	7.96(.26)	4.44(--)	3.75(1.90)
	Adolescent	7.66(2.81)	6.11(2.98)	4.44(0)	5.19(2.62)	4.65(2.87)
Interpersonal Relationships	Preadolescent	9.59(.85)	9.00(1.28)	8.33(2.36)	9.44(--)	7.23(2.38)
	Adolescent	9.24(1.56)	8.59(2.51)	9.17(1.06)	7.22(3.93)	7.56(2.25)
Community Life	Preadolescent	10(.00)	10(.00)	6.67(4.71)	5.56(--)	5.31(2.06)
	Adolescent	7.56(2.65)	5.77(2.93)	3.89(1.43)	3.47(0.20)	3.90(2.55)
Education	Preadolescent	8.55(1.78)	7.09(2.19)	4.91(.66)	4.72(--)	4.65(1.93)
	Adolescent	8.49(1.80)	6.88(2.29)	4.49(1.13)	5.74(3.41)	4.80(2.55)
Employment	Preadolescent	10(--)	10(--)	–	–	–
	Adolescent	8.34(1.77)	6.30(2.81)	5.80(2.17)	5.37(2.88)	5.53(3.16)
Recreation	Preadolescent	8.82(2.12)	7.36(2.46)	7.50(.66)	3.33(--)	4.26(1.89)
	Adolescent	8.14(2.67)	5.76(2.49)	3.96(1.07)	3.33(--)	3.28(1.73)

Table 4. Spearman correlations between motor functionality, receptive vocabulary and participation domains.

	Motor function (GMFCS-E&R)		Receptive vocabulary (TEVI-R)	
Participation (LIFE-H)	Preadolescent	Adolescents	Preadolescent	Adolescent
Nutrition	−.678** ($n = 52$)	−.625** ($n = 61$)	.616**($n = 46$)	.268*($n = 58$)
Fitness	−.699**($n = 55$)	−.657** ($n = 62$)	.504**($n = 49$)	.355**($n = 59$)
Personal Care	−.761**($n = 52$)	−694** ($n = 62$)	.608**($n = 46$)	.417**($n = 59$)
Communication	−.601** ($n = 54$)	−.583** ($n = 64$)	.534**($n = 48$)	.298*($n = 61$)
Housing	−.855** ($n = 49$)	−.583** ($n = 55$)	.546**($n = 44$)	.438**($n = 52$)
Mobility	−.686**($n = 51$)	−.534** ($n = 60$)	.599**($n = 45$)	.336*($n = 57$)
Responsibilities	−.752** ($n = 48$)	−.416** ($n = 57$)	.652**($n = 44$)	.481**($n = 55$)
Interpersonal relationships	−.536** ($n = 53$)	−.335** ($n = 62$)	.372*($n = 47$)	.130(ns) ($n = 59$)
Community life	−.794**($n = 22$)	−.512** ($n = 55$)	.068(ns)($n = 18$)	.385**($n = 53$)
Education	−.710** ($n = 53$)	−.577** ($n = 63$)	.501**($n = 47$)	.287*($n = 60$)
Employment	−.971(ns)($n = 3$)	−.419** ($n = 53$)	.998*($n = 3$)	.138(ns) ($n = 52$)
Recreation	−.740** ($n = 50$)	−.669** ($n = 51$)	.620**($n = 45$)	.370**($n = 48$)

**$p < 0.01$, *$p < 0.05$.

scores in a subset of the adolescents' sample, classified as GMFCS-I or GMFCD-II levels in both special ($n = 15$) or regular schools ($n = 23$) (Table 7).

As Table 7 shows, despite their GMFCS equivalent levels, special school students presented significantly lower scores in mobility, responsibility, community, and recreation domains than their peers with similar motor functionality studying in regular schools. The effect size can be interpreted as large for all these domains, according to Cohen's (1988) criteria. No significant differences were observed in interpersonal relationships, education, and employment domains.

Table 5. Multiple regression models for preadolescent's participation in social roles.

Social Roles LIFE-H			Constant	GMFCS I vs V	GMFCSII vs V	GMFCS III vs V	GMFCS IV vs V	Language TEVI-R	School Placement (1 = special)	R^2	Change R^2	
Mobility	Model 1	β		.73	.15	.12	−0.03			.48	.48	**
		t	7.31	5.93	1.25	1.06	−0.28					
		p	<.001	<.001	.22	.29	0.78					
	Model 2	β		.50	.15	−.02	−0.11	.38		.57	.09	**
		t	3.90	3.57	1.37	−.15	−1.01	2.79				
		p	<.001	<.001	.18	.88	0.32	.01				
	Model 3	β		.33	.10	−.09	−0.17	.27	−.27	.58	.01	Ns
		t	2.45	1.63	.90	−.66	−1.39	1.62	−1.13			
		p	.02	.11	.38	.51	0.17	.11	.27			
Responsibility	Model 1	β		.80	.21	.29	0.04			.581	.581	**
		t	7.63	7.21	1.98	2.74	0.34					
		p	<.001	<.001	.05	.01	0.74					
	Model 2	β		.58	.22	.16	−0.04	.34		.64	.059	*
		t	3.90	4.19	2.13	1.43	−0.36	2.50				
		p	<.001	<.001	.04	.16	0.72	.02				
	Model 3	β		.54	.21	.15	−0.05	.32	−.05	.64	0	Ns
		t	1.62	2.53	1.88	1.09	−0.42	2.07	−.22			
		p	.11	.02	.07	.28	0.68	.05	.83			
Interpersonal Relationships	Model 1	β		.59	.16	.10	0.15			.31	.31	**
		t	19.36	4.29	1.19	.73	1.16					
		p	<.001	<.001	.24	.47	0.25					
	Model 2	β		.51	.16	.05	0.13	.12		.32	.01	Ns
		t	13.49	2.98	1.18	.35	0.93	.71				
		p	<.001	<.001	.24	.73	0.36	.48				
	Model 3	β		.49	.15	.04	0.12	.11	−.03	.32	0	Ns
		t	4.73	1.94	1.06	.26	0.79	.51	−.10			
		p	<.001	.06	.29	.80	0.43	.61	.92			
Community	Model 1	β		.81	.37	.13	0.00			.61	.61	*
		t	6.81	4.12	2.06	.68	0.00					
		p	<.001	<.001	.06	.51	1.00					
	Model 2	β		1.04	.45	.37	0.13	−.38		.685	.075	Ns
		t	5.35	4.56	2.57	1.63	0.68	−1.69				
		p	<.001	<.001	.02	.13	0.51	.12				
	Model 3	β		.85	.35	.25	0.03	−.43	−.24	.696	.01	Ns
		t	3.05	2.25	1.43	.81	0.13	−1.76	−.61			
		p	.01	.05	.18	.44	0.90	.11	.55			
Education	Model 1	β		.78	.17	.03	0.01			.56	.56	**

		t	11.40	7.09	1.61	.28	0.10					
		p	<.001	<.001	.11	.78	0.92					
	Model 2	*β*		.61	.17	−.07	−0.05	.28		.60	.05	*
		t	7.15	4.62	1.68	−.66	−0.46	2.16				
		p	<.001	<.001	.10	.51	0.65	.04				
	Model 3	*β*		.64	.18	−.06	−0.04	.30	.05	.60	.00	Ns
		t	2.236	3.290	1.637	−.473	−.313	1.875	.235			
		p	.031	.002	.109	.639	.756	.068	.816			
Recreation	Model 1	*β*		.79	.22	.23	−0.04			.57	.57	**
		t	8.59	7.03	2.03	2.12	−0.41					
		p	<.001	<.001	.05	.04	0.68					
	Model 2	*β*		.51	.22	.06	−0.14	.46		.69	.12	**
		t	4.71	4.32	2.38	.54	−1.48	3.91				
		p	<.001	<.001	.02	.59	0.15	<.001				
	Model 3	*β*		.28	.16	−.04	−0.22	.30	−.38	.72	.03	Ns
		t	3.50	1.70	1.65	−.37	−2.17	2.18	−1.89			
		p	<.001	.10	.11	.71	0.04	.04	.07			

Table 6. Multiple regression models for adolescent's participation in social roles.

Social Roles LIFE-H			Constant	GMFCS I vs V	GMFCSII vs V	GMFCS III vs V	GMFCS IV vs V	Language TEVI-R	School Placement (1 = special)	R^2	Change R^2	
Mobility	Model 1	*β*		.618	.23	−.135	.031			.349	.349	**
		t	7.224	4.589	1.736	−1.16	.266					
		p	<.001	<.001	.088	.251	.791					
	Model 2	*β*		.386	.08	−.173	.017	0.431		.494	.145	**
		t	4.647	2.878	.647	−.657	.161	3.829				
		p	<.001	.006	.521	.104	.873	0				
	Model 3	*β*		.256	−.009	−.15	.031	.262	−.365	.563	.069	*
		t	5.097	1.91	−.073	−1.524	.316	2.161	−2.806			
		p	<.001	.062	.942	.134	.753	.036	.007			
Responsibility	Model 1	*β*		.478	.188	−.013	.028			.178	.178	*
		t	6.556	3.143	1.252	−.097	.208					
		p	<.001	.003	.217	.923	.836					
	Model 2	*β*		.238	.020	−.109	.034	.535		.413	.235	**
		t	2.995	1.690	.147	−.957	.294	4.432				
		p	.004	.097	.883	.343	.770	.000				
	Model 3	*β*		−.001	−.154	−.054	.045	.285	−.581	.591	.178	**
		t	5.785	−.008	−1.296	−.562	.464	2.474	−4.574			
		p	<.001	.994	.201	.577	.645	.017	.000			
Interpersonal Relationships	Model 1	*β*		.356	.171	.122	−.044			.104	.104	Ns
		t	15.426	2.312	1.131	.897	−.328					
		p	<.001	.025	.263	.374	.744					
	Model 2	*β*		.231	.095	.085	−.046	.264		.162	.058	Ns
		t	11.456	1.412	.621	.634	−.349	1.918				
		p	<.001	.164	.537	.529	.729	.061				
	Model 3	*β*		.229	.093	.085	−.045	.262	−.006	.162	.001	Ns
		t	6.483	1.281	.578	.623	−.344	1.644	−.033			
		p	<.001	.206	.566	.536	.732	.106	.974			
Community	Model 1	*β*		.597	.254	−.047	−.030			.299	.299	**
		t	5.159	3.857	1.689	−.357	−.233					
		p	<.001	<.001	.098	.722	.816					
	Model 2	*β*		.381	.105	−.118	−.044	.382		.414	.115	**
		t	3.172	2.386	.710	−.956	−.371	3.038				
		p	.003	.021	.481	.344	.712	.004				
	Model 3	*β*		.174	−.054	−.152	−.035	.129	−.526	.551	.137	**
		t	5.120	1.145	−.397	−1.389	−.331	0.987	−3.754			
		p	<.001	.258	.693	.171	.742	.329	<.001			
Education	Model 1	*β*		.673	.326	−.044	.062			.366	.366	**

		t	8.937	5.212	2.569	−.384	.555					
		p	. <.001	<.001	.013	.703	.581					
	Model 2	*β*		.553	.260	−.081	.057	.240		.413	.047	*
		t	6.370	3.998	2.040	−.721	.526	2.075				
		p	<.001	<.001	.046	.474	.601	.043				
	Model 3	*β*		.578	.277	−.077	.055	.273	.070	.415	.003	Ns
		t	3.131	3.886	2.082	−.685	.502	2.022	.487			
		p	.003	<.001	.042	.497	.618	.048	.628			
Employment	Model 1	*β*		.505	.106	.015	−.018			.214	.214	*
		t	7.822	3.062	.660	.110	−.134					
		p	<.001	.004	.512	.913	.894					
	Model 2	*β*		.360	.008	−.032	−.025	.292		.285	.071	*
		t	5.789	2.080	.047	−.235	−.187	2.139				
		p	<.001	.043	.963	.815	.852	.038				
	Model 3	*β*		.310	−.032	−.038	−.018	.221	−.149	.298	.013	Ns
		t	4.229	1.707	−.189	−.277	−.139	1.402	−.897			
		p	<.001	.095	.851	.783	.890	.168	.374			
Recreation	Model 1	*β*		.816	.370	.077	.006			.477	.477	**
		t	4.899	5.934	2.739	.648	.050					
		p	<.001	<.001	.009	.521	.961					
	Model 2	*β*		.741	.332	.051	.021	.120		.487	.01	Ns
		t	3.751	4.611	2.348	.410	.185	0.906				
		p	.001	<.001	.024	.684	.854	.370				
	Model 3	*β*		.603	.257	.033	−.004	−.073	−.370	.552	.065	*
		t	4.190	3.715	1.874	.282	−.035	−0.489	−2.448			
		p	<.001	.001	.068	.779	.972	.628	.019			

Discussion

This study describes participation in an extensive variety of daily life activities of students with CP, attending to both special and regular education systems in Chile. A main finding is that motor functions showed important differences considering school placement for the adolescents' group. Since motor function relates to social participation, and special education and regular schools have different proportions of students in each level of our sample, the aforementioned differences in motor functionality, hamper the endeavour of interpreting the individual effect of school placement on social participation levels. Despite the latter, hierarchical regressions proved to be helpful to analyse these results, showing that – for the case of preadolescents – school placement (i.e. special or regular schools) does not make a significant difference in terms of explained variance for participation, over the prior contribution of motor functionality and communication. Conversely, in the sample of adolescent CP students, school placement explained from 7% to 18% of the variability of participation' scores in social roles. This result is in line with those reported by Tan et al. (2016), emphasising that attending special education schools by itself reached borderline significance when social participation is controlled by variables such as epilepsy diagnosis and speech impairment.

Although our findings emerge from a cross-sectional design, results are in line with the results observed by Wendelborg and Tøssebro (2008) in a longitudinal study of social participation of CP students in Norway. Although Wendelborg and Tøssebro (2008) did not comparing special education and regular schools, the authors monitored and compared classroom participation (i.e. time spent in regular classes at regular schools) of children with disabilities for a period of three years. Their findings show that the amount of time in which children with disabilities are absent from regular classes increases as children become older.

Regarding participation in social activities, especially in recreational ones, our findings support that motor functionality and school placement contribute to predict adolescents' participation. In particular, school placement explained 6.5% of the variance over the prior variance explained by motor functionality, evidencing an effect of school placement in student's participation in such activities. This result suggests that attending a special school is related to less participation in recreational activities for adolescents. This finding was not replicated in the preadolescent sample. These results might allow us to establish a link between inclusive education and greater participation in recreational activities, which becomes relevant when considering the importance of these activities in human development. Considering the cross-sectional nature of this study, these findings are different from those reported by Imms and Adair (2017), which suggest that children who

Table 7. Participation scores of students with GMFCS-I and GMFCS-II in regular v/s special schools.

	Special School *M*(SD)	Regular School *M*(SD)	*F*	gl1;gl2	*p*	η_p^2
Mobility	5.58(2.22)	8.62(2.20)	16.48	1;35	<0.001	.32
Responsibility	4.15(1.99)	8.84(1.76)	53.61	1;34	<0.001	.612
Interpersonal Relationships	8.47(2.59)	9.34(1.38)	1.79	1;35	.189	.049
Community	4.47(1.73)	8.37(2.34)	27.38	1;34	<0.001	.446
Education	7.41(2.34)	8.21(1.95)	1.32	1;36	.258	.035
Employment	6.81(2.53)	8.13(2.15)	2.71	1;33	.109	.076
Recreation	5.77(2.29)	8.26(2.74)	7.24	1;30	.012	.19

attend special schools do not experience a decrement in recreational activities during the secondary school years in comparison to children with disabilities who attend regular schools.

Our findings are relevant to understand the participation of students in leisure activities between stages of development, suggesting the existence of differences in participation in recreational and physical activities between preadolescents and adolescents, with greater levels in preadolescence than adolescence, which is in line with the results of Imms and Adair (2017), reporting participation levels for recreational activities were greater in children than adolescents for all levels of GMFCS-E&R.

Concerning the adolescents' sample, of the life habits, the mobility domain and two other domains of the social role dimension of participation – responsibility and community – were significantly predicted by school placements. These results could relate to the effect of students' placement with typical peers in regular classrooms and special needs students' motivations to participate in integrated settings with typically developing peers (Shimmell et al. 2013). Similar to results from previous studies (i.e. Tan et al. 2014, 2016; Vos et al. 2014; Mei et al. 2016), our findings suggest that a low functional performance and communication skills are related to lower participation in several domains of daily activities and situations for both preadolescents and adolescents. In addition, our findings also suggest that motor functionality deficits are related to less participation in both social activities and self-care involvement. Similar results were reported by Lepage et al. (1998) for children, and by Michelsen et al. (2014) for adolescents. This finding suggests that motor functionality can also be considered as a variable that is primarily associated with social participation in the Chilean school context, as it has been reported in recent longitudinal studies in other countries (see Tan et al. 2014, 2016; Vos et al. 2014).

Conclusion

The cross-sectional nature of our study only allowed us to observe relationships among variables that are restricted to a single moment in time. Longitudinal observations and experimental studies are required to observe time-related stability in the studied variables. Likewise, it would have been interesting to include a non-disabled comparison group to estimate differences in terms of participation levels, and also to explore the potential effect of disability in all domains of participation.

Nevertheless, this research has the strength of having included a diverse sample of preadolescents and adolescents with CP, in terms of their functional abilities, communication skills, intellectual abilities, and school placements as has been suggested for other studies (Michelsen et al. 2014; Finnvold 2018).

We suggest that people with motor impairment are more likely to have problems in cognition and communication skills, and thus, differences in participation cannot be attributed only to motor impairment (Michelsen et al. 2014; Tan et al. 2016). Schools' structural conditions and culture also play an important role, but they cannot be considered as the main factor that accounts for the exclusion of people with disabilities (Finnvold 2018). However, it is broadly known that people's environments can facilitate or interfere with their participation in daily life activities (WHO 2001). Although Chile has made substantial progress in terms of promoting equal opportunities for people

with disabilities, social inclusion, and community participation (United Nations 2014), only half of schools in the Chilean regular educational system have developed inclusion programmes for severely impaired children. According to Tamayo et al. (2018), only 55% of regular schools in Chile have inclusion programmes that guarantee accessibility for people with physical disabilities. Therefore, addressing this situation is critical to foster the development, learning, and wellbeing of students with special needs.

Findings from this study highlight the importance of social and daily life participation for people with CP. The latter constitutes a significant endeavour for the development of public policies, especially if we consider the extent to which both structural and curricular conditions impact the opportunities of students with CP to participate in school settings. It can be argued that the lack of public policies regarding this matter might perpetuate a pernicious cycle in which individuals with functional and communication disadvantages will maintain their low levels of social and community participation. Therefore, we expect that the reported findings may lead to both educational and public health policies considering participation as a critical aspect of rehabilitation and wellbeing for individuals with CP. Furthermore, our findings lend support to actual efforts for inclusion of students with special needs in regular school systems.

For instance, these findings have significant implications for educational policies regarding school placement when considering the relevance of inclusive educational settings in several domains of participation. Given the benefits of participation on students' development, one of the immediate positive implications of these findings is to support policies and intervention strategies tackling contextual factors at school that could hinder special needs students' participation. It could also influence curricular policies and programmes to foster participation of special needs students, in order to improve and increase participation levels in young people with significant functional impairments. These activities should focus on enabling participation in both life habits and social role dimensions of participation.

Acknowledgements

This research had the support of Instituto Teletón Concepción, Teletón-Chile and Secretaría Ministerial de Educación, Región del Biobío, Chile.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This research was funded by the National Commission for Scientific and Technological Research of Chile (CONICYT), Proyecto Fondecyt 11110358.

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