

of school than other children (15.1%). Higher percentages of CSHCN with functional limitations reported all types of participation restrictions compared with other CSHCN and non-CSHCN. Among CSHCN with limitations, 25.0% did not participate in organized activities, 73.0% did not work for pay, and 28.3% had not volunteered in the past year. For CSHCN, the odds of certain participation restrictions were higher for those with functional limitations, in fair or poor health, with depressed mood, living at or near the federal poverty level, and living in homes not headed by 2 parents.

**Conclusions:** CSHCN with functional limitations and those with poorer health status have participation restrictions. Social disadvantage furthers the likelihood that CSHCN experience participation restrictions. This study identifies factors that may be amenable to clinical and policy-related interventions.

### Poster 367

#### **Adiposity Moderates the Association Between Gross Motor Functional System and Vitamin D Status Among Adults With Cerebral Palsy.**

Heidi J. Haapala, MD (University of Michigan, Ann Arbor, MI, United States); Margy A. Fox, MS, Edward A. Hurvitz, MD, Mark Peterson, PhD.

**Disclosures:** H. J. Haapala, none.

**Objective:** To examine the vitamin D status of adults with cerebral palsy (CP). A secondary goal was to evaluate the association between vitamin D status, functional level, and anthropometric indicators of adiposity.

**Design:** Cross-sectional study.

**Setting:** Tertiary medical center.

**Participants:** A convenience sample of 106 adults with CP; 55% boys and men; mean age, 34 years (range, 17-75 years); and Gross Motor Functional System (GMFCS) levels I (7%), II (16%), III (26%), IV (26%), and V (25%).

**Interventions:** Serum vitamin D levels, body composition measurement (body mass index [BMI] and waist circumference), and GMFCS assessment.

**Main Outcome Measures:** Vitamin D status, as assessed by serum 25-hydroxy vitamin D level (25(OH)D) in ng/mL; and categorized as (1) normal (>40 ng/mL), (2) low-normal (25-39 ng/mL), (3) deficient (10-24 ng/mL), and (4) severely deficient (<10 ng/mL).

**Results:** Mean vitamin D level was  $28.1 \pm 16.0$  ng/mL. Only 24% of subjects had a normal 25(OH)D, whereas 31% were low normal, 31% were deficient, and 14% were severely deficient. Obesity (BMI>30) was common (20%) as was overweight (BMI, 25-29 [27%]). General linear modeling demonstrated higher 25(OH)D status among GMFCS IV-V ( $32.4 \pm 17.3$  ng/mL) than GMFCS I-III ( $23.7 \pm 13.3$  ng/mL) ( $P < .01$ ). Moreover, this difference was moderated by indicators of adiposity, such that regression revealed a robust negative association between waist circumference and 25(OH)D, even after controlling for GMFCS ( $\beta = -0.28$ ;  $P = .03$ ).

**Conclusions:** Adults with CP are at high risk for low vitamin D levels and thus secondary health declines. Nearly half of the subjects in this cohort had vitamin D levels <25 ng/mL. Less than a fourth of the subjects had a value >40 ng/mL, which is the level suggested by many studies as necessary for optimal bone health and fracture prevention. Waist circumference is a strong predictor for low levels, independent of GMFCS level. The high prevalence of overweight

and obesity, combined with low serum 25(OH)D indicates that there is a need to monitor and support lifestyle recommendations among adults with CP, to reduce secondary risk of cardiometabolic disease and bone deterioration.

### Poster 368

#### **Urinary Incontinence in Adults With Cerebral Palsy: Incidence, Type, and Effects on Participation.**

Christina M. Marciniak, MD (Northwestern University/The Rehabilitation Institute of Chicago, Chicago, IL, United States); Erik J. Beltran, MS, Diane Dudas-Sheehan, Nursing Doctorate, Deborah J. Gaebler-Spira, MD, Michael Jesselson, Sarah A. O'Shea, BA.

**Disclosures:** C. M. Marciniak, Allergan, research grants; Takeda, research grants; Allergan, consulting fees or other remuneration; Ipsen, consulting fees or other remuneration.

**Objective:** To assess the incidence, type, and impact of urinary problems in adults with cerebral palsy (CP) and their relationship with the Gross Motor Functional Classification Scale (GMFCS).

**Design:** Prospective survey study.

**Setting:** Outpatient academic rehabilitation clinic.

**Participants:** 91 adults with CP (46 men, 45 women).

**Interventions:** The subjects were approached at clinic presentation and interviewed regarding current function, type and incidence of bladder issues, and concerns with bladder problems.

**Main Outcome Measures:** International Consultation on Incontinence Questionnaire (ICIQ)-Female or ICIQ-Male Lower Urinary Tract Symptoms Module, GMFCS, employment, and type of residence.

**Results:** Mean age for both women and men was 36 years (range, 18-71 years and 18-79 years, respectively). The subjects were currently GMFCS I, 4.4%; II, 19.8%; III, 13.2%; IV, 41.8%; and V, 20.9%; 96% of women and 85% of men were living at home, with 40% residing with parents, and 15% with spouses; 23% were currently employed. Two subjects had ileostomies and were excluded from all analyses; 7% were using medications for bladder symptoms; 62% of women reported any incontinence, with 47% reporting urinary leakage at least twice per week to daily; 58% of men had any urinary leakage, but 4% reported that this occurred most all of the time; 20% of women and 20% of men had bladder urgency with most all voids, with 29% of women and 24% of men reporting high levels (>5 on a 10-point scale) of this symptom interfering with quality of life; 27% of women and 24% of men had incontinence during sleep. The incontinence score on the ICIQ did not differ by GMFCS (Kruskal Wallis test:  $c2(2)=4.13$ ;  $P=.13$ ). No differences in living situation (home versus other residence) were related to incontinence scores in both women and men (Wilcoxon rank sum test: women,  $z=1.11$  [ $P=.27$ ]; and men,  $z=0.94$  [ $P=.35$ ]). Employment was not related to incontinence scores (Wilcoxon rank sum test: women,  $z=-0.32$  [ $P=.75$ ]; and men,  $z=0.57$  [ $P=.57$ ]).

**Conclusions:** There are high levels of incontinence in adults with CP across GMFCS groups, and the subjects report symptom interference with quality of life. Despite these issues, most adults were living in the community, and incontinence scores were not related to employment.