HHS Public Access

Author manuscript

Birth Defects Res. Author manuscript; available in PMC 2023 June 29.

Published in final edited form as:

Birth Defects Res. 2022 August 15; 114(14): 785–796. doi:10.1002/bdr2.2048.

Medication use during pregnancy among women with congenital physical disabilities

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Abstract

Background: Medication use during pregnancy is common, with up to 90% of pregnant women taking at least one medication. Women with congenital physical disabilities often report co-occurring conditions during pregnancy that may warrant pharmaceutical treatment, however, research is limited. We aim to describe medication use during pregnancy including: pain, psychotropic, and antibacterial medication, among women with and without congenital physical disabilities.

Methods: We used data from the Slone Birth Defects Study (1976–2015), a case–control study that collected information on pre-pregnancy health conditions and exposures among participating mothers. Women with congenital physical disabilities (n = 132) included women with spina bifida, cerebral palsy, muscular dystrophy, limb deficiencies, and other skeletal/connective tissue conditions and were matched by interview year and study site to women without congenital physical disabilities (n = 528). Proportions and difference in proportions for each medication were compared between groups. Simple proportions were also calculated for duration and multiple medication use variables.

Results: Women with congenital physical disabilities more frequently reported use of pain (acetaminophen and opioids), psychotropic (antidepressants), and antibacterial medications during pregnancy. Women with congenital physical disabilities used pain and psychotropic medications for longer, frequent durations, and more frequently reported haven taken multiple medications during pregnancy.

Conclusion: Women with congenital physical disabilities report higher medication use during pregnancy compared to women without physical disabilities. Patterns may be attributable to

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CONFLICT OF INTEREST

The authors report no conflicts of interest or relevant financial relationships.

SUPPORTING INFORMATION

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co-occurring conditions or increased risk of pregnancy complications in this population. Further research is needed to describe the patterns of medication use for clinical decisions regarding treatment of pregnant women with disabilities.

Keywords

medications; perinatal health; pharmaceuticals; physical disability; pregnancy

1 | INTRODUCTION

Medication use during pregnancy is common, with up to 90% of pregnant women in developed countries taking at least one prescription or over-the-counter (OTC) medication (Daw, Hanley, Greyson, & Morgan, 2011; Honein, Gilboa, & Broussard, 2014; Mitchell et al., 2011; Stanley, Durham, Sterrett, & Wallace, 2019). Women with congenital physical disabilities, like spina bifida and cerebral palsy, frequently report sequelae such as chronic pain, depression, and genitourinary infections, which are often treated medications (Ehde et al., 2003; Shepard, Yan, Hollingsworth, & Kraft, 2018; Vega et al., 2019). Medication during pregnancy can be critical in maintaining the mother's health, but may lead to certain pregnancy complications. Understanding the prevalence of medication use during pregnancy among women with congenital physical disabilities is important to better recognize their specific health needs that may warrant clinical treatment, as well as assessing the cause of the increased risk of pregnancy complications common in this population (Huezo García, Parker, Petersen, Rubenstein, & Werler, 2021; Tarasoff, Ravindran, et al., 2020).

Women with physical disabilities are more likely to take medications because of high incidence of co-occurring conditions. Chronic pain is the most common co-occurring condition among persons with physical disabilities; and among all pregnant women, pain is a commonly reported symptom which is often treated with analgesics (Interrante et al., 2017; Ray-Griffith, Wendel, Stowe, & Magann, 2018; Shah et al., 2015; Werler, Mitchell, Hernandez-Diaz, & Honein, 2005). Acetaminophen and ibuprofen are the most common medications taken in pregnancy (Price & Collier, 2017). Depression has also been documented as a frequent co-occurring condition among people with physical disabilities, with an estimated 30% to 60% of women with physical disabilities experiencing depressive symptoms, compared with only 10% of non-disabled pregnant women (Dicianno et al., 2015; Mitra, Long-Bellil, Iezzoni, Smeltzer, & Smith, 2016; Nosek, Hughes, & Robinson-Whelen, 2008; Sabharwal, 2014; Smith et al., 2019; Wagner et al., 2015; Winblad, Jensen, Månsson, Samuelsson, & Lindberg, 2010). Prescription medication is the most common form of treatment for depression (Howdeshell & Ornoy, 2017; Ko, Farr, Dietz, & Robbins, 2012). Additionally, pregnant women have an increased risk of genitourinary infections and antibacterials are the most common group of prescription medications used during pregnancy (Bánhidy, Ács, Puhó, & Czeizel, 2007; Crider et al., 2009; Mitchell et al., 2011; Sharami, Afrakhteh, & Shakiba, 2007). Women with physical disabilities are even more likely to experience genitourinary than women without physical disabilities (Armour et al., 2009; Mann et al., 2015; Shepard et al., 2018). However, little is known about pain, psychotropic, or antibacterial medication use specific to women with congenital physical disabilities during pregnancy despite their indications being common co-occurring

conditions. A few studies have shown that women with disabilities report use of medications (e.g., opioids, antidepressants, antibacterials) during pregnancy more often than those without disabilities, but most are not specific to women with congenital physical disabilities (Bateman et al., 2014; Desai, Hernandez-Diaz, Bateman, & Huybrechts, 2014; Tarasoff, Lunsky, et al., 2020).

Medication prescribed to treat co-occurring conditions have the potential to impact birth and pregnancy outcomes (Källén & Reis, 2016; Yazdy, Desai, & Brogly, 2015). Certain pain medications (e.g., ibuprofen, opioids), anti-depressants (selective serotine reuptake inhibitors), and antibacterial medications (e.g., sulfonamides, nitrofurantoins) are associated with adverse birth outcomes, such as low birth weight, preterm delivery, and congenital anomalies (Crider et al., 2009; Reefhuis, Devine, Friedman, Louik, & Honein, 2015; Yazdy et al., 2015). Furthermore, as pregnant women are often excluded from clinical trials, we do not know if some medications increase risks for sub-optimal pregnancy outcomes. The concern for medication causing poor pregnancy outcomes may be greater among pregnant women with congenital physical disabilities than the general population given their greater burden of co-occurring conditions that often warrant medical treatment.

Therefore, we aim to describe medication use during pregnancy among women with congenital physical disabilities allowing us to understand which medications may be important to assess when examining etiologies of sub-optimal pregnancy outcomes in a high-risk population. Utilizing data from the Boston University Slone Epidemiology Center Birth Defects Study (BDS; U.S. and Canada, years 1976–2015), we present a descriptive analysis of the use of pain, psychotropic, and antibacterial medications between women with and without congenital physical disabilities.

2 | METHODS

2.1 | Study population

We utilized data collected by the BDS, a multi-site, case–control study that aimed to examine risk factors for congenital disabilities. BDS enrolled over 51,000 women from 1976 to 2015 from the greater metropolitan and surrounding areas of Boston, Toronto, Philadelphia, San Diego, Nashville, and upstate New York. Each study site ascertained cases (terminations, stillbirths, and live births) with congenital anomalies via birth and tertiary care hospitals and vital records. Controls without known congenital anomalies were selected from the same recruitment areas. Trained nurses conducted standardized interviews with the mothers of cases and controls, in person (1976-mid 1998) or by telephone (1998–2011) within six months after delivery. Interviews included standardized questions on sociodemographic information, lifestyle behaviors (e.g., smoking, alcohol use), and medication use. Medication information reported by the mothers were linked to the Slone Drug Dictionary, a data tool that provides active ingredient information for medications that have been extensively coded and classified (Kelley, Kelley, Kaufman, & Mitchell, 2003). Information on prescription and OTC medications use included: medication type (i.e., pills, nasal sprays), brand name (i.e., Tylenol, Advil), dosage, and duration.

During the interview, women were asked “Were you or the baby's father or any of your family members born with any of the following birth defects?: Brain/head/eye/spine/spinal cord/spina bifida; muscles/bones/arms/legs; cleft lip/palate/gum; heart/blood vessels; lungs/throat/windpipe; kidney/ureter/bladder/sex organs; tumor/cysts; food pipe/stomach/intestines/bowel/rectum; or other defect.” All reports of “mother/self” as the family member with the congenital disability were reviewed by research staff. Women with congenital physical disabilities were defined as mothers who reported having one of the following: spina bifida, cerebral palsy, muscular dystrophy, contractures, arthrogryposis, or other skeletal and connective tissue conditions for a total of 132 women. We grouped these specific conditions together because they all affect physical functioning in similar ways (i.e., mobility and/or dexterity). Women without congenital physical disabilities were participants who reported no congenital disabilities for “mother/self” and were selected at a four to one ratio matched by interview year and study site to help account for time and place differences and patterns of medication use over the course of the study. There were a total of 528 women in the comparison group.

2.2 | Medication use categories

We categorized medications by their active ingredient and grouped medications as pain, psychotropic, and antibacterial. For pain medications, we examined: acetaminophen, ibuprofen, naproxen, aspirin, and opioids. Psychotropic medications included anti-depressants, selective serotonin reuptake inhibitors (SSRI), benzodiazepines, and barbiturates. For antibacterial medication, we included penicillin, macrolides, erythromycins, anti-fungals, and other medications as one variable due to small cell sizes. We defined medication exposure during pregnancy as ‘use’ or “no use” from the date of the last menstrual period through date of delivery.

In addition to examining specific medications, we also created variables for any use of pain and psychotropic medications during pregnancy. Participants who took at least one type of medication within each category were defined as exposed. To assess duration and frequency of use, we categorized medication use as 1–2 days, 3–30 days, >30 days less than weekly (long-term infrequent use), and > 30 days weekly or more frequent (long-term frequent use). Duration is reported as the maximum cumulative days during the course of the pregnancy, not consecutive days. For participants who reported use of more than one medication within a group (e.g., aspirin and ibuprofen in the pain medication group), we counted the medication with the highest max duration to categorize their duration. To examine the use of multiple medications, we created count variables for use of any indicated medications (from 0 to ≥4 medications; includes: acetaminophen, ibuprofen, naproxen, aspirin, opioids, anti-depressants, SSRIs, benzodiazepines, barbiturates, and antibacterials) and pain medications (0 to ≥3 medications; includes: acetaminophen, ibuprofen, naproxen, aspirin, and opioids), given the number of multiple medications reported by individual users within this category.

2.3 | Analytic methods

First, we describe distributions in participant characteristics among women with and without physical congenital disabilities, including: mothers age (<20, 20–24, 25–29, or ≥ 30), race/

ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and Other), and years of education (<12 years, 12 years, > 12 years), reproductive and pregnancy characteristics, that is, parity, gravidity, plurality, infant biological sex, whether pregnancy was planned, time of first prenatal visit (≤8 weeks or > 8 weeks of pregnancy), delivery type (vaginal or cesarean section), and health-related co-occurring conditions and exposures, for example, pre-pregnancy body mass index (BMI)(kg/m^2; <18.5, 18.5–24.9, 25.0–29.9, or ≥ 30), smoker status (smoker during pregnancy or non-smoker), alcohol use (no drinks, <4 drinks/day, or ≥4 drinks/day), and genitourinary infections (yes/no) during pregnancy including: sexually transmitted infections (STI), vaginal infections, and kidney/bladder infections.

Proportions for medication type and category were compared between women with and without congenital physical disabilities, using the crude difference and 95% confidence interval (CI). Simple proportions for any pain and psychotropic medication use were calculated for the three largest groups of congenital physical disabilities (spina bifida, cerebral palsy/muscular dystrophy, arthrogryposis/contractures), duration of medication use, and multiple medication use variables.

Since these data are drawn from a case–control study of child congenital anomalies, our sample over-represents mothers of infants with congenital anomalies. If medication use differs between mothers of cases and controls, our comparisons between mothers with and without congenital disabilities could be distorted. To address this possibility, we report medication use by original infant case–control status (i.e., infant with and without congenital anomalies) to assess potential differences in medication use in supplemental analyses (see Appendix). Additionally, we applied a weight variable to the data set to represent the approximate 3% national prevalence of major congenital anomalies. This reweighting approach is explained in further detail elsewhere (Huezo García et al., 2021; Richardson, Rzehak, Klenk, & Weiland, 2007). We present unweighted and weighted estimates for all analyses in supplemental tables (see Appendix). All analyses were conducted using SAS version 9.4.

3 | RESULTS

Women with congenital physical disabilities were more likely to be white, have had no previous births or pregnancies, not have planned the pregnancy, and have had a cesarean delivery, have pre-pregnancy BMI ≥25 kg/m^2 compared to women without congenital physical disabilities (Table 1). When comparing pregnancy exposures, women with congenital physical disabilities were more likely to smoke, report a vaginal or kidney/bladder infection compared to those without congenital physical disabilities.

Women with congenital physical disabilities reported medication use more frequently during pregnancy compared to women without congenital physical disabilities (Table 2) Women with congenital physical disabilities reported greater use of pain medication including: acetaminophen (74.2% vs. 63.2%) and opioids (12.1% vs. 5.9%) compared to women without congenital physical disabilities, but there were no observable differences for any pain medication use. Reported use of any psychotropic medications was also higher for women with congenital physical disabilities (14.4% vs. 6.4%; Difference = 7.95%, 95%

CI: 1.61, 14.30), specifically antidepressant use (9.9% vs. 3.0%). Lastly, anti-microbial medication use was more frequently reported by women with congenital physical disabilities (40.9% vs. 30.5%; Difference = 10.42%, 95% CI: 1.16, 19.68) compared to women without congenital physical disabilities. When stratified by disability diagnosis groups, at least 70% of women across each group report using any type of pain medication; 20% of women with cerebral palsy and/or muscular dystrophy; and 16% of women with spina bifida report using any psychotropic medications; and at least a third or more of women in each group report antibacterial use (Table 3).

Compared to women without congenital physical disabilities, women with congenital physical disabilities who take any pain medications during pregnancy reported use for longer durations and more frequently (Table 4). Among women with congenital physical disabilities who take medications during pregnancy, half of women have long-term frequent use of pain medications (49.0% vs. 36.6%) and a majority have long-term frequent use any psychotropic medications (84.2% vs. 73.5%). Table 5 shows multiple medication use during pregnancy. Compared to their counterparts, women with congenital physical disabilities more frequently reported haven taken four or more of any medications (10.6% vs. 4.2%) and three or more pain medications (8.3% vs. 4.3%).

Tables with the unweighted distributions (as shown in Tables 2, 4, 5) and weighted distributions are included as supplementary material (see Appendix). Medication use is generally comparable between the weighted and unweighted distributions, except when cell sizes are small (Tables S2 and S3).

4 | DISCUSSION

In this study, women with congenital physical disabilities were more likely to report use of pain, psychotropic, and antibacterial medications during pregnancy compared to women without congenital physical disabilities. The findings in this study are consistent with the prior, albeit limited, research documenting increased medication use among women with disabilities.

The findings in this study may be explained by the greater likelihood of co-occurring conditions, which are often treated with medications, among women with congenital physical disabilities compared to the general population. Chronic pain is the most common co-occurring condition among persons with physical disabilities, yet treatment for chronic pain in this population has been especially understudied (Alriksson-Schmidt, Josenby, Lindquist, & Westbom, 2018; Blackman, Svensson, & Marchand, 2018; Ehde et al., 2003; Engel, Kartin, & Jensen, 2002; Nosek et al., 2006; Wagner et al., 2015). One study among persons with cerebral palsy found that over half of participants used non-narcotic medications (e.g., acetaminophen, ibuprofen) for pain relief, and about one-third used narcotics such as codeine or metha-done (Engel et al., 2002). Moreover, among all pregnant women, pain is a commonly reported symptom and often treated with medication (Interrante et al., 2017; Ray-Griffith et al., 2018; Shah et al., 2015; Werler et al., 2005). Studies of Medicaid and commercial insurance administrative claims report that 15–20% of women are prescribed opioids during pregnancy (Bateman et al., 2014; Desai et al., 2014). A

study of pregnant women with chronic pain conditions reported that 43% were exposed to prescription opioids, 43% to acetaminophen, and over 90% of participants were taking at least one prescription medication such as opioids or anti-depressants (Ray-Griffith, Morrison, & Stowe, 2019). We found that women with congenital physical disabilities used multiple types of pain medications, more frequently, and for longer durations, which amplifies the concern of proper management of chronic pain during pregnancy experienced by this population.

Depression has also been documented as a frequent co-occurring condition among people with physical disabilities (Bellin et al., 2010; Dicianno et al., 2015; Mitra et al., 2016; Nosek et al., 2008; Sabharwal, 2014; Smith et al., 2019; Wagner et al., 2015; Winblad et al., 2010). Studies of persons with spina bifida, cerebral palsy, and muscular dystrophy show that 20–30% experience symptoms of depression (Dicianno et al., 2015; Sabharwal, 2014; Smith et al., 2019; Van Der Slot et al., 2012; Winblad et al., 2010). In pregnant women overall, prevalence of depression has been reported in about 7% of women in the first trimester and 12% in the second and third trimesters, but there are no current estimates among pregnant women with physical disabilities (Howdeshell & Ornoy, 2017). One study found that antidepressant use during pregnancy among women with intellectual and developmental disabilities was 15% (Brown, Lunsky, Wilton, Cobigo, & Vigod, 2016). Our study also shows that women with congenital physical disabilities use antidepressant medications more often than women without congenital physical disabilities (15% vs. 2%, respectively).

Lastly, studies have found that in general, women with physical disabilities are more likely to have genitourinary infections than women without physical disabilities. Women with spina bifida are more likely to have a urinary tract infection (UTI) compared to those without spina bifida and UTI is the most common cause for hospital visits in adults with spina bifida (Armour et al., 2009; Mann et al., 2015; Shepard et al., 2018). Furthermore, a study found that women with physical disabilities were more likely to have UTIs and other infections during pregnancy, which were associated with adverse birth outcomes including preterm birth and low birthweight (Morton et al., 2013). Our current study found that pregnant women with congenital physical disabilities report genitourinary infections and antibacterial medication use more often than their unaffected counterparts, which might be explained by the fact that some women with physical disabilities have neurogenic bladders and use catheters, which increase the risk of urinary infections and may require a regular antibiotic treatment plan (Morton et al., 2013).

A major strength of our study is the availability of detailed data on medication use, particularly over-the-counter products, and patterns of actual use, which are not typically available in administrative claims. Furthermore, we were able to examine the pregnancy experiences of often rare congenital physical disabilities among child-bearing women. There are some limitations in the current study. We were unable to validate self-reported maternal congenital disability status through, for instance, medical records. While this is one of the largest studies of child-bearing women reporting congenital disabilities, our sample size was not large enough to assess medication use by each individual diagnosis type. Furthermore, we lacked details on physical function limitations. Thus, the group “congenital physical disability” encompasses several different congenital conditions that each affect physical

functioning and/or mobility, but to varying degrees. We acknowledge that disability is not homogenous experience and differences in medication use among each disability type most likely exists. We tabulate medication use for sub-groups of congenital conditions with presumably more similar mobility and physical functioning, but cell sizes were relatively small. Moreover, to maximize our sample size, we included data from the entire span of the Slone BDS. To control for possible time trends, we matched on interview year. Although the long study period may mean that the covariate distributions, and clinical practices related to medication treatment affecting pregnant women with disabilities have changed over time. Also, we were not able to assess specific antibacterial medications (e.g., penicillin, macrolides, erythromycins) or indication for use. Certain types of antibacterial medications such as sulfonamides and nitrofurantoins, have been linked to increased risks in congenital disabilities among infants (Crider et al., 2009). Barbiturates and benzodiazepines were grouped under psychoactive medications, but they can be taken for pain as well as other indications. Furthermore, women's reports of medication use during pregnancy may be subject to some recall error, although women were interviewed shortly after the delivery within 6 months. We also did not assess gestational timing of medication use due to insufficient cell counts, though we understand that there are critical time periods during pregnancy that may or may not affect certain outcomes. Lastly, though we theorized that women with congenital physical disabilities have higher medication use due to increased risk of co-occurring conditions, we were not able to examine such relationships. Additionally, limited research has shown that medication prescription has increased among persons with disabilities and that polypharmacy is common in this population (Lott et al., 2004; Morden et al., 2014). Thus, it may be a common clinical practice to prescribe medications to people with disabilities above and beyond indication, instead of utilizing alternative non-pharmaceutical interventions; however, this is beyond the scope of this paper.

5 | CONCLUSION

This study of women with congenital physical disabilities found that reported medication use during pregnancy was more common compared to women without congenital physical disabilities. This is consistent with the few, limited studies reporting increased use of medications for conditions commonly treated with medications among women with disabilities. Further research is needed to describe patterns and effectiveness of medication use during pregnancy among women with congenital physical disabilities, as well as other disabilities, to aid clinical decision making regarding the best method for treatment of pregnant women in this population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS

We thank the Boston University Slone Epidemiology Center and study participants for their generosity and time in these research efforts.

Funding information

This work was supported by the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health [grant number R03HD098507]. The funding source was not involved in the study design; collection, analysis and interpretation of data; writing; and decision to publish the article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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TABLE 1

Descriptive characteristics of women in the Slone Birth Defects Study, 1976–2015, by congenital disability status

n **(%)**	**Congenital physical disability (*n* = 132)**	**No congenital physical disability (*n* = 528)**
Infant with congenital anomaly		
Yes	113 (85.61)	373 (70.64)
No	19 (14.39)	155 (29.36)
Infant gender		
Male	75 (56.82)	284 (53.99)
Female	57 (43.18)	242 (46.01)
Missing	–	2
Mother age		
<20	9 (6.82)	36 (6.82)
20–24	31 (23.48)	87 (16.48)
25–29	36 (27.27)	155 (29.36)
≥30	56 (42.42)	250 (47.35)
Race/ethnicity		
Non-Hispanic White	110 (83.33)	400 (75.76)
Non-Hispanic Black	10 (7.58)	39 (7.39)
Hispanic	10 (7.58)	62 (11.74)
Other	2 (1.52)	27 (5.11)
Education		
<12 years	18 (13.64)	59 (11.17)
12 years	36 (27.27)	121 (22.92)
>12 years	78 (59.09)	348 (65.91)
Parity		
0	72 (54.55)	219 (41.48)
1	38 (28.79)	202 (38.26)
2	15 (11.36)	78 (14.77)
≥3	7 (5.30)	29 (5.49)
Gravidity		
1	55 (41.66)	158 (29.98)

***n* (%)**	**Congenital physical disability (*n* = 132)**	**No congenital physical disability (*n* = 528)**
2	34 (25.76)	166 (31.50)
≥3	43 (32.58)	203 (38.52)
Missing	-	1
Planned pregnancy		
Yes	65 (54.17)	306 (63.75)
No	55 (45.83)	174 (36.25)
Missing[a]	12	48
Plurality		
Singleton	128 (97.71)	510 (96.77)
Multiple	3 (2.29)	17 (3.23)
Missing	1	1
First prenatal visit		
≤ 8 weeks	50 (57.47)	193 (54.67)
> 8 weeks	37 (42.53)	160 (45.33)
Missing[b]	45	175
Delivery type		
Vaginal	63 (53.39)	319 (67.02)
Cesarean section	55 (46.61)	157 (32.98)
Missing[c]	14	52
Pre-pregnancy BMI (kg/m^2)		
Underweight (<18.5)	8 (8.60)	22 (6.03)
Normal (18.5–24.9)	50 (53.76)	217 (59.45)
Overweight (25.0–29.9)	16 (17.20)	81 (22.19)
Obese (≥30.0)	19 (20.43)	45 (12.33)
Missing[d]	39	163
Smoking		
Yes	49 (37.12)	155 (29.36)
No	83 (62.88)	373 (70.64)
Alcohol (LMP – first trimester)		
0 drinks	72 (54.55)	304 (57.58)

n (%)	Congenital physical disability (*n* = 132)	No congenital physical disability (*n* = 528)
<4 drinks	44 (33.33)	172 (32.58)
≥ 4 drinks	16 (12.12)	52 (9.85)
Sexually transmitted infection		
Yes	2 (1.52)	12 (2.27)
No	130 (98.48)	516 (97.73)
Vaginal infection		
Yes	22 (16.67)	66 (12.50)
No	110 (83.33)	462 (87.50)
Kidney/bladder infection		
Yes	20 (15.15)	46 (8.71)
No	112 (84.85)	482 (91.29)
Mother diagnoses		
Spina bifida	44 (33.33)	-
Cerebral palsy	16 (12.12)	-
Muscular dystrophy	14 (10.61)	-
Arthrogryposis/Contractures	47 (35.61)	-
Other skeletal or connective tissue conditions	11 (8.33)	-
Study center		
Boston	56 (42.42)	224 (42.42)
Philadelphia	29 (21.97)	116 (21.97)
Toronto	22 (16.67)	88 (16.67)
Iowa	1 (0.76)	4 (0.76)
San Diego	7 (5.30)	28 (5.30)
New York	15 (11.36)	60 (11.36)
Nashville	2 (1.52)	8 (1.52)
Interview year		
Before 1990	25 (18.94)	100 (18.94)
1990–1999	31 (23.48)	124 (23.48)
2000–2009	42 (31.82)	168 (31.82)
During or after 2010	34 (25.76)	136 (25.76)

Abbreviations: BMI, body mass index; LMP, last menstrual period.

[a]Question not asked 1976–1983.

[b]Question not asked 1976–1983 and 1993–1998.

[c]Question not asked 1993–1998.

[d]Question not asked 1976–1992.

TABLE 2

Frequency of medication use during pregnancy in the Slone Birth Defects Study, 1976–2015; by congenital physical disability status

n **(%)**	**Congenital physical disability (*n* = 132)**	**No congenital physical disability (*n* = 528)**	**Difference in proportions (95% CI)**
Pain medications			
Any use	104 (78.79)	380 (71.97)	6.82 (−1.14, 14.78)
Aspirin			
Yes	18 (13.64)	69 (13.07)	0.57 (−5.95, 7.09)
Ibuprofen			
Yes	23 (17.42)	106 (20.08)	−2.65 (−4.67, 9.97)
Naproxen			
Yes	7 (5.30)	11 (2.08)	3.22 (−0.79, 7.23)
Acetaminophen			
Yes	98 (74.24)	334 (63.26)	10.98 (2.47, 19.50)
Opioids			
Yes	16 (12.12)	31 (5.87)	6.25 (0.33, 12.17)
Psychotropic medications			
Any use	19 (14.39)	34 (6.44)	7.95 (1.61, 14.30)
Antidepressants			
Yes	13 (9.85)	16 (3.03)	6.82 (1.53, 12.11)
SSRI			
Yes	7 (5.30)	13 (2.46)	2.84 (−1.20, 6.89)
Benzodiazepines			
Yes	1 (0.76)	11 (2.08)	−1.33 (−3.24, 0.59)
Barbiturates			
Yes	6 (4.55)	10 (1.89)	2.65 (−1.09, 6.39)
Antibacterial medications			
Antimicrobials			
Yes	54 (40.91)	161 (30.49)	10.42 (1.16, 19.68)

Abbreviations: CI, confidence interval; SSRI, selective serotonin reuptake inhibitors.

TABLE 3

Medication use during pregnancy in the Slone Birth Defects Study, 1976–2015; by diagnosis type

n **(%)**	**Spina bifida (*n* = 44)**	**Cerebral palsy and muscular dystrophy (*n* = 30)**	**Arthrogryposis and contractures (*n* = 47)**
Any pain medication use			
Yes	35 (79.55)	21 (70.00)	39 (82.98)
Any psychotropic medication use			
Yes	7 (15.91)	6 (20.00)	4 (8.51)
Any antibacterial medications use			
Yes	18 (40.91)	10 (33.33)	22 (46.81)

TABLE 4

Duration of pain and psychotropic medication use during pregnancy in the Slone Birth Defects Study, 1976–2015; by congenital physical disability status

n **(%)**	**Congenital physical disability**	**No congenital physical disability**
Any pain medications		
1–2 days	7 (6.73)	35 (9.21)
3–30 days	5 (4.81)	66 (17.37)
Long-term infrequent use	41 (39.42)	140 (36.84)
Long-term frequent use	51 (49.04)	139 (36.58)
Any psychotropic medications		
1–2 days	3 (15.79)	4 (11.76)
3–30 days	--	2 (5.88)
Long-term infrequent use	--	3 (8.82)
Long-term frequent use	16 (84.21)	25 (73.53)

Note: Duration is reported as the cumulative max number of days medication is used during pregnancy, not consecutive days of use.

TABLE 5

Medication count frequencies during pregnancy in the Slone Birth Defects Study, 1976–2015; by congenital physical disability status

n **(%)**	**Congenital physical disability (*n* = 132)**	**No congenital physical disability (*n* = 528)**
Indicated medication		
count[a]		
0	12 (9.09)	111 (21.02)
1	47 (35.61)	184 (34.85)
2	46 (34.85)	149 (28.22)
3	13 (9.85)	62 (11.74)
4 or more	14 (10.61)	22 (4.17)
Pain medication		
count[b]		
0	28 (21.21)	148 (28.03)
1	60 (45.45)	232 (43.94)
2	33 (25.00)	125 (23.67)
3 or more	11 (8.33)	23 (4.36)

[a]Includes: acetaminophen, ibuprofen, naproxen, aspirin, opioids, anti-depressants, SSRIs, benzodiazepines, barbiturates, and antibacterials.

[b]Pain medications include: acetaminophen, ibuprofen, naproxen, aspirin, and opioids.