

Disordered Sleep in PWS

Data Exploration

WIRB exemption status received on August 14, 2018



Prepared for Living Well with Prader-Willi Syndrome and PWS Love Bugs



Congenital\Genetic



Capturing Patient Experience Data

The Problem

Capturing patient experience data and applying it to the drug development and regulatory process is often lengthy, laborious, and expensive. This is further complicated for rare diseases where affected patient populations are typically small, heterogeneous, and widely dispersed.

The Solution

TREND analyzes years of real-world experience data shared within social networks to gain valuable insights into the community's perspective on living with rare disease. These data are de-identified and summarized into a Community Voice Report, which can then lead to Data Explorations and Health Initiatives.

Community Voice Report

The Community Voice Report follows the FDA's patient input Guidelines for Patient-Focused Drug Development meetings and aims to quantify disease burden, disease management strategies, and possible unmet needs.

Data Explorations

TREND Data Explorations further analyze existing social data to uncover deeper insights. Unlike the breadth of a Community Voice Report, Data Explorations examine a single topic and reanalyze the surrounding posts, comments, and feedback to better understand the community's interest.

Health Initiatives

TREND Community Health Initiatives bring community members together on the TREND Community™ platform to collectively track specific data and explore potential solutions to address an identified unmet need.

"The TREND report was invaluable in helping us define the questions and multiple-choice answers that should be included in our Externally Led Patient Focused Drug Development Meeting last June."

*—Kyle Bryant, FARA, rideATAXIA Founder/
Program Director*

TREND Community categorizes diseases using the Genetic and Rare Diseases (GARD) Information Center database.



Cancer



Congenital/Genetic



Viral Infections



Musculoskeletal



Skin Diseases



Nervous System



Metabolic



Blood Diseases



Endocrine

How It Works

All of our projects start with community engagement. Due to the unique difficulties of rare and chronic disease, many groups have created social networks online to support and validate each other. In these groups, community members are able to tell stories, promote advocacy, and share advice for managing symptoms, navigating the health care system, and living with a rare or chronic disease. We connect with individuals and leaders in these communities to learn about their illnesses, understand the current state of medical knowledge, and determine how our partnership can best address their unmet needs.

Once we have established a relationship with the community and gained consent, we download the deidentified data from these social media streams. These data are run through our analytics engine, named Krystie after the dear daughter of one of our community members. Krystie quickly analyzes vast amounts of data from years' worth of community discussion. Analysts manually code a sample of the data to validate the algorithms and train the engine to identify deeper insights (for example, to detect whether the speaker is a patient or a caregiver). This analysis culminates in a custom Community Voice Report.

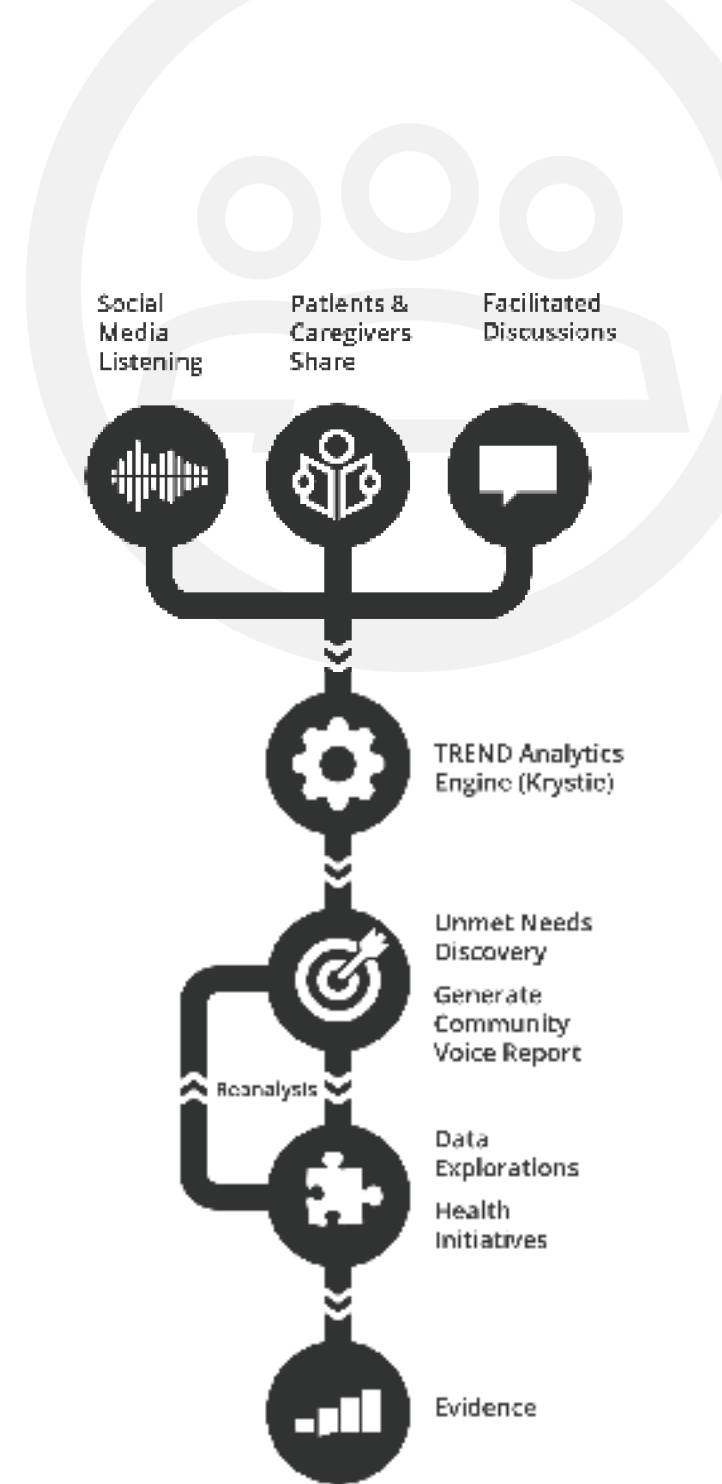
These Community Voice Reports are shared with the community free of charge, and our industry stakeholders have the opportunity to license the data for projects that address unmet needs and improve quality of life. These insights may be used to design Data Explorations or Health Initiatives.

Industry Stakeholders use TREND data to:

- Establish disease natural history
- Identify unmet therapeutic needs
- Understand quality of life issues
- Design better clinical trials
- Build a case for patient-centered regulatory approvals

Community Stakeholders use TREND data to:

- Inform medical and support teams
- Educate family members
- Catalyze research
- Spread awareness and advocacy



Overview

TREND analyzed the online conversations between caregivers of children with the rare genetic disorder Prader-Willi syndrome (PWS) that took place in the private Facebook group Living Well with Prader-Willi Syndrome. We reported our results in *The Prader-Willi Syndrome Community Voice Report (September 17, 2018)*. During this analysis, we learned that community members want to better understand if sleep issues may be related to the symptoms of the disease.

To further investigate this issue, TREND Community partnered with sleep specialists Daniel Glaze, MD FAASM and Ameet Patel, DO at Texas Children's Hospital / Baylor College of Medicine to begin to quantify the problem of disordered sleep in this population through an analysis of two private Facebook groups where caregivers share their experiences living with this rare disease.

This TREND retrospective analysis received IRB exemption status from The Western Institutional Review Board on August 14, 2018. Harmony Biosciences provided funding in support of this work.

Facebook Page Stats

Living Well with Prader-Willi Syndrome

Living Well with Prader-Willi Syndrome is a page for parents and legal guardians to discuss various types of alternative/complementary approaches, alongside traditional treatment, in order to support the health and well-being of our children with Prader-Willi syndrome (PWS).

PWS Love Bugs

For parents of babies ages 0-2, Lovebugs is a FB group created for newly diagnosed PWS parents to find friendship, advice, and support.

1261
Members

2027
Posts

24,357
Comments

Date Range: June 4, 2013 - June 8, 2018

433
Members

15,150
Posts

146,458
Comments

Date Range: March 29, 2012 - July 16, 2018

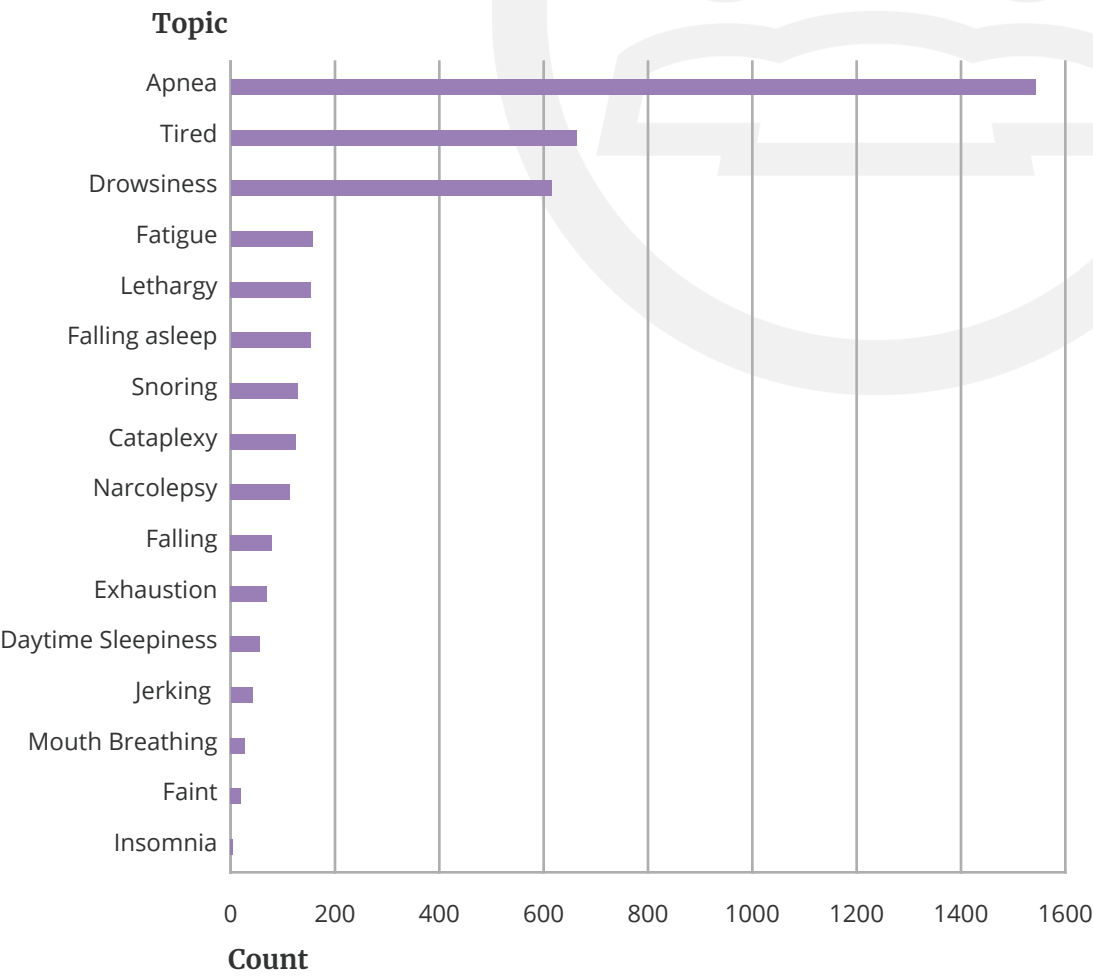
Issues of Sleep in PWS

Research in PWS is largely focused on issues of hyperphagia and eating¹. Anecdotal reports and a small body of research suggest that sleep issues may be related to the symptoms of the disease and postulate that treating the sleep issues may reduce these other symptoms, including hunger².

TREND worked with Dr. Glaze and Dr. Patel to describe how disordered sleep presents in this population. Using this information, we developed a custom codebook and trained the TREND Analytics Engine to quantify these issues through an analysis of social data.

Symptoms of narcolepsy and cataplexy, sitting upright at night and head bobbing are some of the terms/phrases included in our codebook. TREND performed a summary analysis in these areas.

In total, 3749 sleep-related symptoms were found in the comments (883 in Living Well and 2911 in Love Bugs). The results of our summary analysis are provided on the right.



¹ Carrel A.L., Allen D.B. (2018) Growth Hormone Therapy in Children with Prader-Willi Syndrome. In: Radovick S., Misra M. (eds) Pediatric Endocrinology. Springer, Cham

² Ha JF (2017) Sleep Disordered Breathing in Prader-Willi Syndrome: A Review. Res J Clin Pediatr 1:2. Weselake et al, (2014) Prader-Willi Syndrome, Excessive Daytime Sleepiness, and Narcoleptic Symptoms: A Case Report. J of Medical Case Reports 8:127

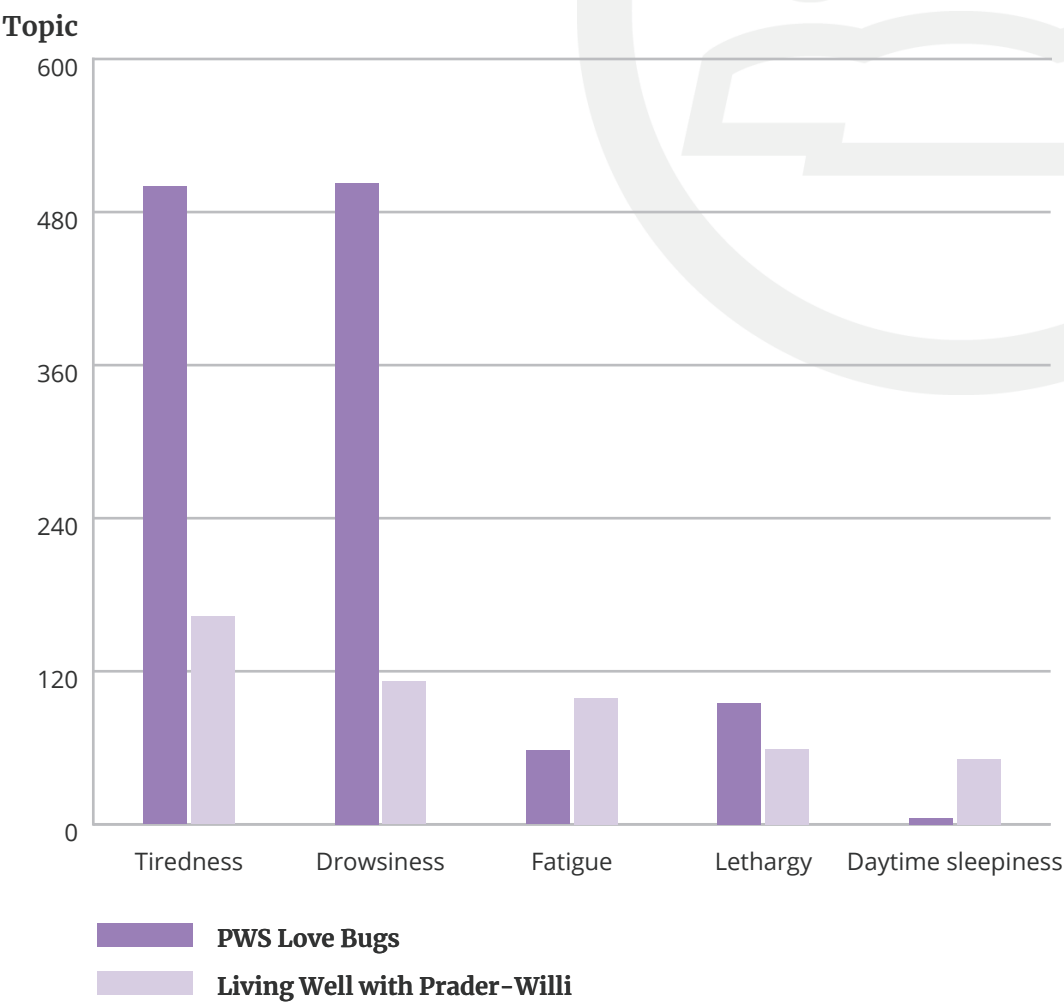


Daytime Sleepiness

Excessive Daytime Sleepiness (EDS) is a common feature of PWS. Most people do not talk about EDS in those specific terms, however. In the data, we found the terms tired, drowsiness, sleepiness, fatigue, and lethargy were used to describe the behavior.

In these conversations, people often discussed using diet and drugs to improve daytime sleepiness and some noted that when children with PWS had less sleepiness, they learned more and were better behaved. Both diet, low carb/high fat diets in particular, and the drugs, Provigil and Pitolisant, were reported in the discussions to decrease daytime sleepiness and improve academic and behavioral performance.

Another way to measure EDS is to look at the need for naps. There were only 13 mentions of frequent napping in these conversations. This is a low count, and it may be useful to ask caregivers if they feel their children need naps during the day.

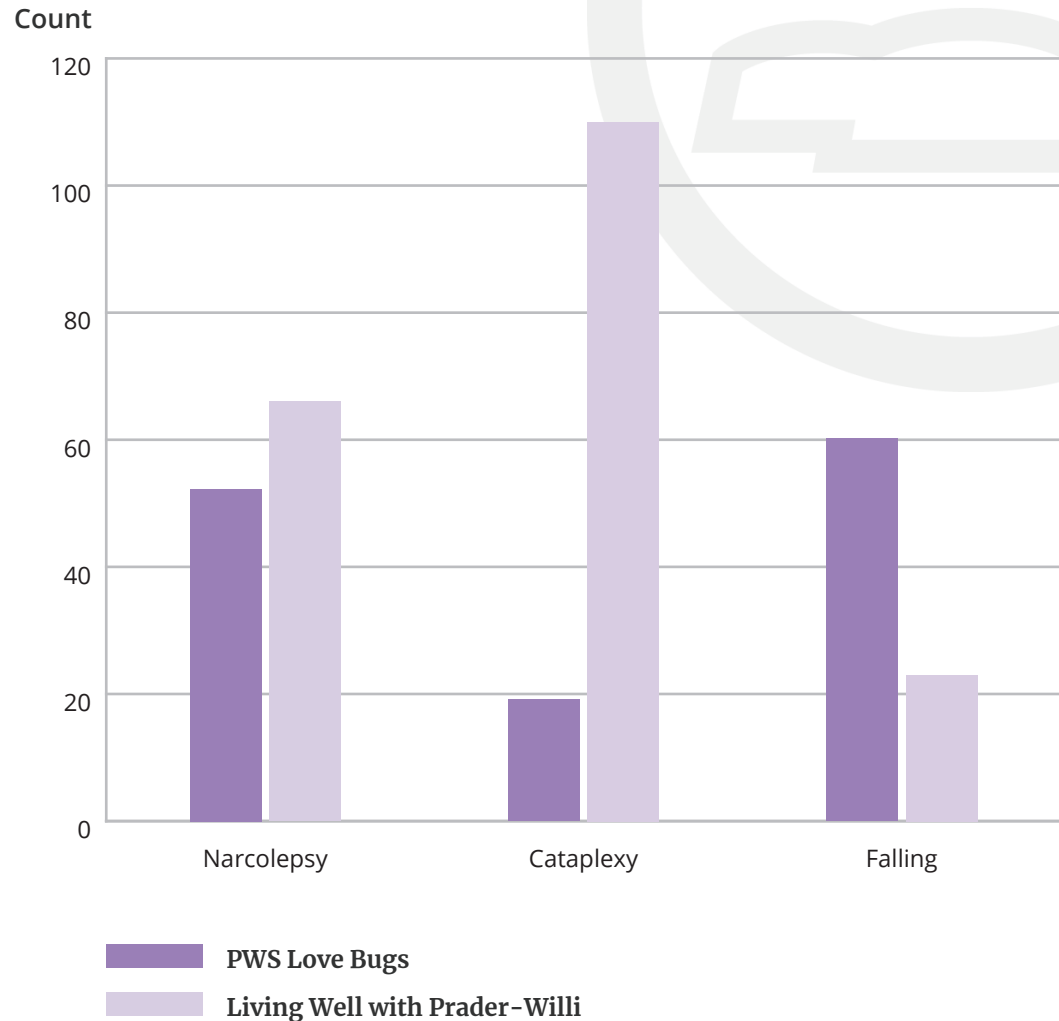


Narcolepsy and Cataplexy

In the Living Well group, narcolepsy was mentioned 66 times, and cataplexy 110. In the Love Bugs group, narcolepsy was mentioned 48 times and cataplexy was mentioned 15 times.

Sleep attacks or sudden sleeping were mentioned twice, although one mention called this “fainting,” as the caregiver may have been unaware of this symptom of narcolepsy/PWS.

Balance and falling issues can also be related to narcolepsy. We noticed that issues of balance and falling were mentioned 23 times in the Living Well data. Caregivers most often discussed falling frequency as it related to food and hydration, not sleep. This may be because they don’t know that sleep is related to falling frequency. In the younger children, issues around falling were discussed 56 times, as parents watched their children learn to sit up, crawl and stand up. Further research is needed to understand how issues of falling relate to sleep.



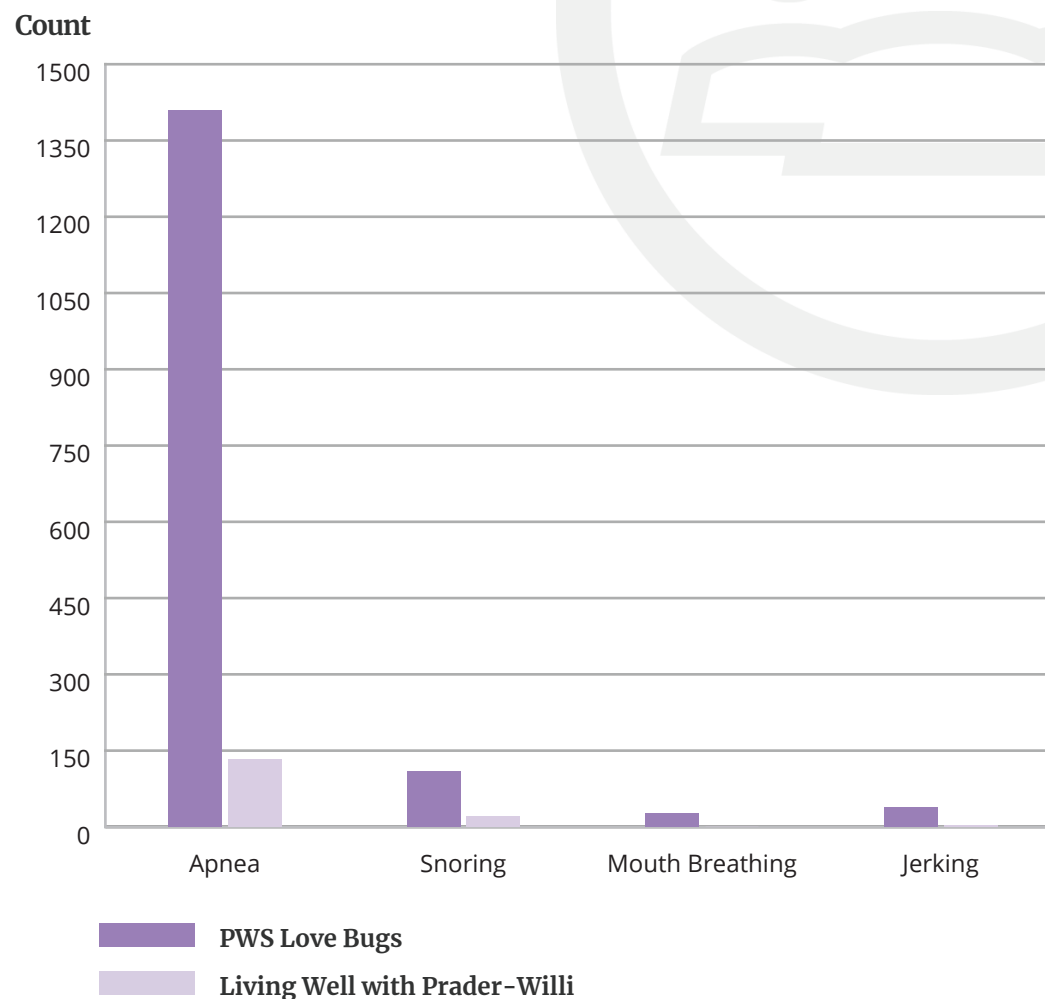
Apnea

Sleep apnea is commonly associated with PWS. Apnea was mentioned 133 times in the Living Well group. In the Love Bugs group, apnea was mentioned more frequently – 1410 times.

Snoring was mentioned 20 times in the older group, and in the younger group snoring was mentioned 109 times.

Gasping and mouth breathing during sleep were not discussed in the older group, nor was sitting upright during sleep, both of which are behaviors associated with breathing issues during sleep. In the younger group, gasping and mouth breathing were mentioned 27 times, with 17 of those mentions about gasping or choking during sleep.

Jerking movements during sleep were discussed 3 times in the older group, mostly with surprise so this may be something to make the PWS community aware of and then we may find that more people are noticing this symptom in their children. In the younger group, twitching or jerking motions were discussed 39 times, with 7 of those discussions specifically mentioning that the jerking motions were taking place during sleep.



Other Sleep Issues

Falling asleep was mentioned 104 times in the older children, some of those mentions were about how easily a child fell asleep and some about difficulty falling asleep. In the Love Bug data, falling asleep was mentioned 49 times. This was often associated with babies falling asleep before eating enough.

We found one mention of a child (in the Living Well group) waking up with a strange feeling in the hands and feet. This may have been discussed more, but it was difficult to locate the discussion in the data. Weak muscles came up twice. Desire to walk or move during sleep was not mentioned, although we may want to look more closely to see if this was discussed.

"I asked our geneticist about this. My little girl will be playing one second in her high chair then passed out head slumped over the next second. He said it is narcoleptic like but just excessive daytime sleepiness which is very common with PWS."

—Community Member

"The only similar behavior that we have experienced was when <name> was a baby and we introduced grains into her diet and they made her pass out."

—Community Member

About TREND Community

Founders

TREND Community™ was founded by the parents of a child with Prader-Willi Syndrome who understand the needs of the rare and chronic disease community.

Our mission is to improve the quality of life for everyone living with rare and chronic disease.

Security

TREND secures all social data with state-of-the-art, private cloud servers. Our security practices comply with current HIPAA, FDA, and GDPR guidelines.

Disclaimer

The researchers who prepared this report are not doctors, are not providing medical advice, and are only reporting what was said in the online conversations.

IRB Exemption Status

Western Institutional Review Board determined that this study is exempt under 45 CFR § 46.104(d)(4), because the aim of the research is to collect de-identified information from social media posts to better understand disease

burden, disease management strategies, quality of life, and the unmet needs of patient communities living with rare and chronic diseases. The research is not FDA-regulated nor classified, does not involve prisoners, and is consistent with the ethical principles of the Belmont Report.

Quotes

All quotes were provided by consenting community participants through one-on-one interviews or online focus groups conducted on the TREND Community™ platform. Names are not included to protect participant privacy.

Data Ownership

Ownership of public posts or conversations from other social media platforms shared with TREND for analysis are subject to the social media platform's privacy policy, terms of service and other applicable policies. Participants who share data and experiences on the TREND Community™ platform give their consent for TREND to analyze it. TREND Community owns the results of our analysis and all other data and output that we produce including our Community Voice Reports.

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