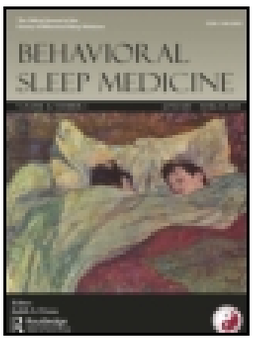

Behavioral Sleep Medicine

ISSN: 1540-2002 (Print) 1540-2010 (Online) Journal homepage: https://www.tandfonline.com/loi/hbsm20

# How Does Narcolepsy Impact Health-Related Quality of Life? A Mixed-Methods Study

Jason C. Ong, Rina S. Fox, Rylee F. Brower, Sophia Mazurek & Cameron Moore

**To cite this article:** Jason C. Ong, Rina S. Fox, Rylee F. Brower, Sophia Mazurek & Cameron Moore (2020): How Does Narcolepsy Impact Health-Related Quality of Life? A Mixed-Methods Study, Behavioral Sleep Medicine, DOI: 10.1080/15402002.2020.1715411

**To link to this article:** https://doi.org/10.1080/15402002.2020.1715411

BEHAVIORAL SLEEP MEDICINE
https://doi.org/10.1080/15402002.2020.1715411

Taylor & Francis
Taylor & Francis Group



# How Does Narcolepsy Impact Health-Related Quality of Life? A Mixed-Methods Study

Jason C. Ong [a], Rina S. Fox[b], Rylee F. Brower[c], Sophia Mazurek[a], and Cameron Moore[a]

[a]Department of Neurology, Center for Circadian and Sleep Medicine, Northwestern University Feinberg School of Medicine, USA; [b]Department of Medical Social Sciences, Northwestern University Feinberg School of Medicine, USA; [c]Department of Neurobiology, Physiology, and Behavior, University of California, Davis, USA

**ABSTRACT**

**Study Objectives**: The purpose of this study was to identify patient-centered issues affecting Health-Related Quality of Life (HRQoL) in people with narcolepsy (PWN) and to evaluate patient-reported outcome measures using a mixed-methods approach.

**Methods**: Twenty-nine adults (93% female, mean age = 31 years) with an established diagnosis of narcolepsy (Type I = 58.6%) completed focus group interviews using live videoconferencing. Additionally, participants completed the Patient-Reported Outcomes Measurement Information System (PROMIS) measures along with legacy measures commonly used in narcolepsy research (Epworth Sleepiness Scale, Patient Health Questionnaire, Short-Form 36).

**Results**: Thematic analysis of qualitative data revealed that HRQoL was impacted by the constancy of sleepiness, unpredictability of narcolepsy symptoms, and negative public perception of narcolepsy. Challenges to accessibility and/or quality of care included dissatisfaction with non-sleep specialists' understanding of narcolepsy, the unpredictability of symptoms, and the cost of health care. There was enthusiasm for developing a psychosocial intervention to improve HRQoL using online access, but there were mixed opinions regarding the format, provider background, and content of the intervention. Elevations (T-score > 60) were found on PROMIS measures of depression, anxiety, fatigue, and sleep impairment. These patterns were consistent with the levels reported on legacy measures. PWN Type I reported lower levels of general health relative to Type II ($p < .05$).

**Conclusions**: These findings lay the groundwork for more targeted efforts to address areas of diminished HRQoL in PWN. Additionally, PROMIS measures appear to be suitable and efficient instruments for assessing HRQoL in PWN.

## Introduction

Narcolepsy is a debilitating sleep disorder involving persistent excessive daytime sleepiness (EDS) that currently has no cure. Pharmacotherapy can provide short-term reductions in EDS, but the persistence of narcolepsy symptoms and the burden of chronic management can compromise health-related quality of life (HRQoL). People with narcolepsy (PWN) report elevated symptoms of depression and anxiety (Dauvilliers et al., 2009; Flores, Villa, Black, Chervin, & Witt, 2016; Neikrug, Crawford, & Ong, 2016) and significant reductions in overall HRQoL (Daniels, King, Smith, & Shneerson, 2001; Dodel et al., 2007; Ervik, Abdelnoor, Heier, Ramberg, & Strand, 2006; Ozaki et al., 2008) even when treated with pharmacotherapy (Dauvilliers et al., 2009). PWN have two to three times the rate of mood and anxiety

**CONTACT** Jason C. Ong jason.ong@northwestern.edu Department of Neurology, Center for Circadian and Sleep Medicine, Northwestern University Feinberg School of Medicine, 710 N Lake Shore Drive, Room 1114, Chicago, IL 60611

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/hbsm.

Supplemental data for this article can be accessed here.

disorders and significantly higher work absenteeism compared to matched controls (Flores et al., 2016). Furthermore, PWN use twice the amount of medications for comorbid medical and psychiatric conditions compared to matched controls (Black et al., 2014), and a recent study evaluating psychiatric and medical comorbidities of narcolepsy found that 37% of participants were taking anti-depressant medications (Ohayon, 2013). Finally, the symptoms of narcolepsy can affect interpersonal relationships. Of 50 PWN treated at a single sleep disorders clinic, 72% reported marital and family conflicts and 20% identified narcolepsy as the reason for divorce or separation (Kales et al., 1982). These observational studies highlight that poor psychosocial functioning remains a significant problem among PWN.

Currently, there are no formal interventions directly aimed at improving HRQoL in PWN. To address this clinical need, our lab has begun work on developing a psychosocial intervention for PWN following a phased approach recommended for behavioral treatment development (Czajkowski et al., 2015; Rounsaville, Carroll, & Onken, 2001). In an early Phase I study, we examined the need and potential interest in non-pharmacological approaches to help improve psychosocial functioning and symptom management in people with hypersomnia (Neikrug et al., 2016). Between 61% and 91% endorsed at least one cardinal symptom of depression and anxiety. Furthermore, 73.9% reported being "somewhat" or "extremely" interested in learning cognitive and behavioral strategies for improving psychosocial functioning and managing symptoms of narcolepsy. These data provide support for the interest and acceptability of a psychosocial intervention for narcolepsy.

Prior to conducting further testing, the treatment components and the parameters of delivering the intervention must be determined (Czajkowski et al., 2015; Rounsaville et al., 2001). This includes identifying modifiable behavioral risk factors that can serve as treatment targets, determining appropriate delivery formats, and identifying therapist skills needed to deliver the intervention. As part of this phase of treatment development, several important knowledge gaps should be addressed. First, why are current mental health services not adequately addressing psychosocial issues in PWN? Second, what are the necessary skills or training to conduct the intervention? Third, what are the optimal delivery parameters that would be acceptable to patients (e.g., individual, groups, in-person, telehealth). Since these issues are difficult to resolve through quantitative measures, qualitative methods such as focus group interviews with the target patient population are often recommended as part of this step of treatment development (Czajkowski et al., 2015). Activities at this stage should also inform future protocol development, such as the concurrent selection of outcome measures that are most appropriate to capture the effects of the intervention. Currently, data on the effects of treatment on HRQoL in PWN are very limited. Therefore, it is difficult to know which outcome measures are most salient and appropriate for use with this population. Troubleshooting treatment and design issues at this early stage can enhance the rigor of future clinical studies, such as a randomized controlled trial (Czajkowski et al., 2015; Rounsaville et al., 2001).

The purpose of this study was to gather patient-centered data on treatment-related issues affecting HRQoL in PWN using a mixed-methods approach. The first aim was to examine how narcolepsy symptoms affect HRQoL with the goal of informing a psychosocial intervention for PWN. The second aim was to evaluate the feasibility of assessing HRQoL among PWN using the Patient-Reported Outcomes Measurement Information System (PROMIS). The desired outcome was to identify specific treatment issues and considerations for assessing HRQoL that can inform future clinical studies and clinical care for PWN.

## Methods

### *Participants and procedures*

Participants in this study had to be at least 18 years of age, report elevated symptoms of depression defined as a total score of 10 or greater on the Patient Health Questionnaire-9 (PHQ-9), have a documented diagnosis of narcolepsy (Type I or Type II), have a stable internet connection, and be fluent in English. Enrollment in this study opened at the beginning of May 2018 and was closed at

the end of August 2018. The primary method of recruitment was through online resources. This included online study advertisements distributed by the patient organization Wake Up Narcolepsy using social media platforms, with one Facebook post in May 2018 and one Instagram post in June 2018. Wake Up Narcolepsy also posted a study advertisement on their website. In addition, e-mails were sent to participants of previous research studies conducted by our lab who provided consent to be contacted for future research studies. As a secondary method, local recruitment efforts included flyers and brochures distributed to the Northwestern Medicine Sleep Disorders Clinic and other local sleep clinics. Participants who responded to these recruitment efforts and expressed interest in participating (n = 75) received an e-mail from the study team containing a link to complete on-line screening questionnaires on Research Electronic Data Capture (REDCap), a secure, web-based application designed to support data capture for research studies (Harris et al., 2009). Those that met inclusion criteria for the study (n = 64) were scheduled for a brief phone screening interview to review the consent form and further assess any remaining issues related to study eligibility. Those who were eligible to continue (n = 38) were asked to send their signed written consent forms and documentation confirming diagnosis of narcolepsy (e.g., PSG/MSLT report, progress note, or letter from physician with an ICD code) via e-mail. Participants received an e-mail from the study team which included a personalized link to complete the quantitative measures (i.e., demographic and clinical measures) on REDCap. Those who provided all documentation and completed the study questionnaires were scheduled for a focus group interview based on their availability (n = 30). One participant was scheduled but did not attend the focus group and did not respond to subsequent efforts to reschedule. As a result, the final sample size consisted of 29 participants with complete data. The study flow diagram is presented in Figure 1.

Focus groups were used in this study to gather qualitative data. All focus groups were conducted online using a live videoconferencing platform (BlueJeans.com) and were audio recorded. The focus groups were led by a member of the research team using a semi-structured interview guide (see online supplement), which was developed by the research team with the purpose of obtaining patient-centered responses in three domains: 1) factors that relate to HRQoL, 2) perceived challenges or barriers to receiving quality care for narcolepsy, and 3) patient preferences about the content and delivery format of a proposed psychosocial intervention for narcolepsy. The interview guide was designed to create structure and consistency for assessing each of the three domains across all focus groups interviews while allowing the moderator to have flexibility in choosing the actual questions asked at each focus group based on the responses of participants and group dynamics. This approach follows recommendations for qualitative research using focus groups to emphasize open group discussions on the domains of interest with the moderator facilitating the discussion based on the interview guide (Morgan, 1996). The audio recordings were saved on secure servers and transcribed into text for qualitative data analysis. This study was approved by the Institutional Review Board at Northwestern University and all study activities were conducted at Northwestern University.

## Measures

All quantitative measures were collected using REDCap. This included a participant information questionnaire to collect demographic data to characterize the sample, and a set of clinical measures that included legacy measures for daytime functioning, depressive symptoms, daytime sleepiness, and HRQoL, as well as the PROMIS measures.

### Patient health questionnaire (PHQ)

The PHQ-9 is a 9-item self-report scale of depressive symptoms based on the Primary Care Evaluation of Mental Disorders (PRIME-MD) and has been validated to assess the severity of depression in clinical practice (Kroenke, Spitzer, & Williams, 2001). Responses are scored from 0 “not at all” to 3 “nearly every day” with higher scores indicating more depressive symptomatology and a maximum score of 27. When compared to a mental health professional interview, a PHQ score ≥ 10 had a sensitivity of 88% and

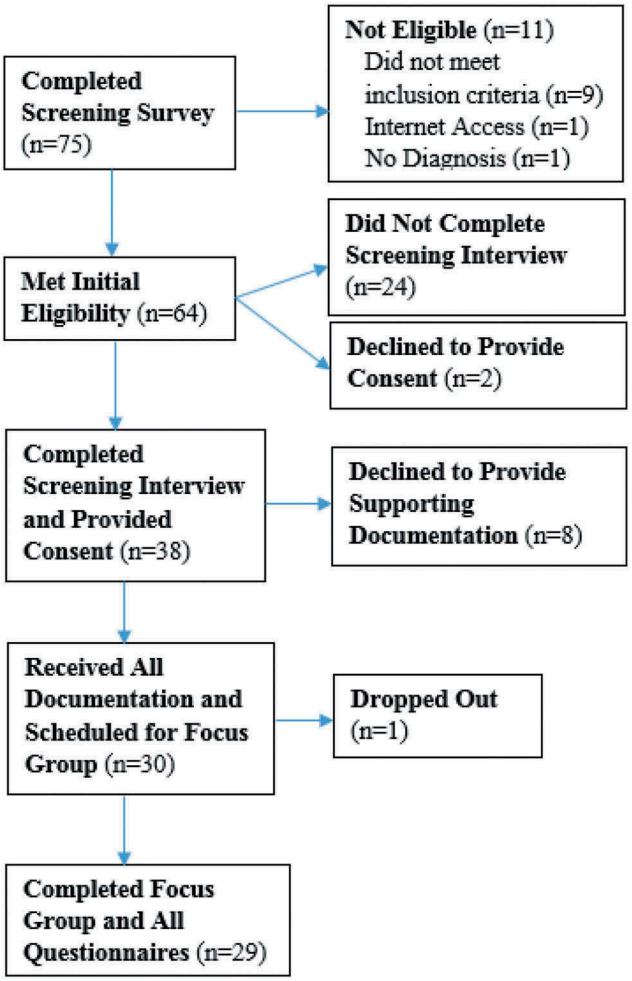


**Figure 1.** Study flow diagram with details related to exclusion criteria.

a specificity of 88% for major depression (Kroenke et al., 2001). In addition, PHQ-9 scores of 5, 10, 15, and 20 were found to correspond to mild, moderate, moderately severe, and severe depression, respectively (Kroenke et al., 2001). In this study, a PHQ total score ≥ 10 (moderate severity) was used for inclusion.

### *Epworth sleepiness scale (ESS)*

The ESS is an 8-item scale that measures the propensity to fall asleep in eight common situations (Johns, 1991). The scale ranges from 0 "would never doze" to 3 "high chance", with higher scores indicating greater daytime sleepiness and a maximum score of 24. The ESS has high internal consistency (Cronbach's alpha = 0.88) (Johns, 1993) and test-retest reliability stays high over 5 months in normal subjects (Antic et al., 2011).

### *Short-form 36-item health survey (SF-36)*

The SF-36 (v 1.0) is a widely-used scale that provides a profile of HRQoL using eight subscales: physical functioning, role limitations due to physical health (role-physical), role limitations due to personal or emotional problems (role-emotional), emotional well-being, social functioning, energy/fatigue, general health, and perceived change in health (Ware & Sherbourne, 1992). Scoring consists

of recoding responses to a 0 to 100 scale, such that higher scores define a more favorable health state. Items are then grouped to create the eight scale scores.

### PROMIS

PROMIS is a measurement system designed to assess patient-reported symptoms and HRQoL across various conditions (www.nihpromis.org). The PROMIS measures administered in this study were depression, anxiety, fatigue, sleep disturbance, sleep-related impairment, pain interference, and physical function. These measures were assessed with computer adaptive tests (CATs), which used an item bank comprised of questions calibrated by item response theory to administer questions tailored to participant symptoms (Lai et al., 2011). This allows scores to be compared across participants regardless of which questions from the item bank they completed. A T-score is generated for each specific measure that can be used to determine symptom severity and comparisons to other populations. These T-scores have been standardized so that a score of 50 represents the mean for the population with which the measure was developed, with a standard deviation of 10. The sleep disturbance and sleep-related impairment measures were developed with a combination of individuals from the general population and individuals with sleep disorders. All other administered PROMIS measures were developed with individuals from the U.S. general population. Across all PROMIS measures, higher scores indicate higher levels of the construct being assessed. In the case of depression, anxiety, fatigue, sleep disturbance, sleep-related impairment, and pain interference, higher scores correspond to worse outcomes. The general interpretation for T-scores on these PROMIS measures are as follows: $< 55$ normal, 55–59 mild, 60–69 moderate, $\geq 70$ severe. In the case of physical functioning, lower scores represent lower levels of functioning, thus $> 45$ normal, 41–45 mild, 31–40 moderate, $\leq 30$ severe.

### Data analyses

This was a convergent parallel design using mixed methods that included qualitative data from focus group interviews and descriptive data on demographic and clinical measures to characterize the sample. For qualitative data, thematic analysis was used to code and derive themes from the focus groups based upon guidelines described by Braun and Clarke (2006). First, three focus groups were selected at random for preliminary independent review by a member of the research team (JO, RF, SM). The findings from the preliminary review were discussed to develop an initial hierarchical structure of themes and nodes, which was used as a code book. Two raters (SM, CM) then used this code book to independently review each of the remaining focus groups. Once all focus group data were coded, the themes and nodes were reviewed and revised by the research team to minimize overlap and redundancy, and then collated into overarching semantic themes. These themes were then refined in an iterative process until consensus was reached among all raters. Final themes were also guided by the research questions of interest, which pertained to the issues that PWN face regarding HRQoL, perspectives on current treatment options, and patient preferences for developing a psychosocial treatment for narcolepsy. For quantitative data, one-way ANOVAs were conducted on clinical measures to examine differences between PWN Type I and Type II with a $p$ value $<.05$ used for statistical significance.

## Results

The final sample consisted of 27 female and 2 male adults. The average age was 31.07 years (SD = 7.57 years) with a range from 21 to 57 years. Nearly 90% of the sample identified as White, 3% identified as African-American, and 7% as multi-ethnic. The typical participant had a college level education (mean years of education = 16.88 years, SD = 1.71). The majority of participants were diagnosed with Narcolepsy Type I (58.6%). The mean time since diagnosis was 4.34 years (SD = 3.61). Though efforts were made to recruit participants from the Northwestern Medicine

Sleep Disorders Clinic, all participants were recruited from online sources, with 52% from social media posts, 28% from e-mail, and the remaining 20% from a nonspecific online source (e.g., "online" or Wake Up Narcolepsy). Please see Table 1 for demographic information.

## Focus group interviews

Ten focus groups were conducted with an average of 2.9 participants per group (SD = 1.10; range = 1 to 5). All focus groups were scheduled with at least two participants, but one focus group consisted of only one individual due to unexpected absences from other participants scheduled for that group. Six of the 10 groups were led by the first author (JO), two groups were led by the third author (RB), and two groups were co-led by the first and third authors. Thematic analyses revealed three major themes with several sub-themes.

### Impact of narcolepsy on health-related quality of life (HRQoL)

The first major theme involved a consistent endorsement among all participants that narcolepsy has a negative impact on HRQoL (see Table 2). The symptoms that had the greatest impact on HRQoL were the constancy of EDS and the unpredictability of cataplexy (for those with Narcolepsy Type I). Responses included several sub-themes: negative perceptions of narcolepsy, impact on self-esteem and self-efficacy, impact from physical symptoms of narcolepsy, impact on social life, impact on family planning and relationships, and impact on occupational functioning. The negative public perception of narcolepsy was driven by a fundamental misunderstanding of the disease or insensitivity from others about narcolepsy symptoms. Several participants felt that narcolepsy was "an invisible disease," noting that others would doubt their diagnosis or joke about their condition with comments such as "Oh, that sounds great. I wish I slept all the time." There were many comments about how narcolepsy had a negative impact on self-esteem. Comments included being "ashamed of having narcolepsy" and not having any "self-worth" or a very "negative" sense of self. Other participants commented on the impact on self-efficacy, describing feelings of being incapable of functioning at their desired level. One participant stated, "I feel like I've gone in my head from somebody who was capable to someone who's not capable." The impact from physical symptoms, such as cataplexy, was reported by several participants. One participant described avoidance of and anxiety related to places where she might have a cataplectic attack without safeguards (e.g., large open areas). There were also many examples of the negative impact on social life. One participant said that narcolepsy "destroyed my social life" due to significant limitations in travel and physical activities. Another participant commented on the unpredictable nature of sleepiness and sleep attacks, stating "I can't plan because I don't know what days I'm just going to be exhausted … " Others felt that functional limitations impacted their ability to engage with friends or the degree to which they were able to invest time and energy in making or maintaining friendships. Several

**Table 1.** Sample characteristics.

| Characteristic | |
|---|---|
| Sex (n, %) | |
| Female | 27 (93.1%) |
| Male | 2 (6.9%) |
| Race (n, %) | |
| White | 26 (89.7%) |
| Black | 1 (3.4%) |
| More than one race | 2 (6.9%) |
| Age (Mean, SD) | 31.1 years (SD = 7.6) |
| Years of Education (Mean, SD) | 16.9 years (SD = 1.7) |
| Narcolepsy Diagnosis (n, %) | |
| Type I | 17 (58.6%) |
| Type II | 12 (41.4%) |
| Time since diagnosis (Mean, SD) | 4.3 years (SD = 3.6) |

**Table 2.** Focus group responses on quality of life.

| Sub-Theme | Quote | Demographic |
|---|---|---|
| Negative Perceptions | "[People say:] I don't think you have narcolepsy. I think you're just tired." | Female, 28 Type I |
| | "[People say:] Well it doesn't look like anything's wrong with you." | Female, 33 Type I |
| | "I feel like people think of it as kind of a joke … And they're like, 'Oh, that sounds great. I wish I slept all the time'." | Female, 26 Type II |
| | "I need to be treated for narcolepsy. The depression is secondary to the narcolepsy, and nobody was taking me seriously. Absolutely nobody." | Female, 33 Type I |
| Impact on self-esteem and self-efficacy | "The biggest struggle is people thinking you look okay, and you're dying inside." | Female, 28 Type I |
| | "I feel like I've gone in my head from somebody who was capable to someone who's not capable." | Female, 28 Type I |
| | "When I got diagnosed, I kinda went through losing all hope … I went through, basically, I guess you would call it a breakdown, which is why I ended up with family." | Female, 26 Type I |
| | "I've always been ashamed of my narcolepsy." | Female, 28 Type I |
| | "I just don't have any self-worth … I feel like I'm a different person than I used to be." | Female, 26 Type II |
| | "When I do think about myself, it's very negative … very limited in what I can do." | Female, 26 Type II |
| | "I mean, I wasn't depressed because I was depressed, I was depressed because narcolepsy took me out of social situations." | Female, 57 Type II |
| | "When you couple [narcolepsy] with depression and anxiety, they interplay on each other … I wanna be more of an active person in the community, but it's really hard." | Female, 26 Type I |
| Impact from physical symptoms | "It's almost like we're addicted to sleep … the only way to feel better and to rid of that craving is to close our eyes and actually fall asleep, but it never goes away." | Female, 36 Type I |
| | "And when I'm exhausted, I'm crying. I'm on the edge all the time now." | Female, 26 Type I |
| | "Sometimes I just can't manage. I can't get the energy to get up and do stuff even though I want to do it." | Female, 38 Type II |
| | "Basically, what made me go downhill was, with my cataplexy, I was walking on campus. And there was this long spot on campus that there isn't really anything to hold onto. And I had an incident in which I went all the way down to the ground. Even to this day, I still avoid that area. And it's really taken a lot out of me." | Female, 21 Type I |
| Impact on social life | "Destroyed my social life … I was very active in traveling, doing a lot of activities … I can't really do as much as I used to." | Male, 29 Type I |
| | "I can't plan. Because I don't know what days I'm just going to be exhausted and all my energy has to go into my career to make my life more stable." | Female, 26 Type II |
| | "[Friends] feel like they can't joke around me … people have stopped inviting me out." | Female, 21 Type I |
| | "I can't keep in touch. I can't follow through. I can't meet up with them. I can't be invested. And it has ruined relationships too." | Female, 31 Type I |
| | "So, even when I do want to go out and socialize at night, I'm always checking the clock, wanting to go home, and get home before my bedtime. And I know that's annoyed a lot of people." | Female, 28 Type I |
| Impact on family planning/ relationships | "I definitely feel scared to have kids because … I'm gonna be too tired to do stuff with my kids … It's my fear and my fear of being pregnant and not being able to take my medication." | Female, 28 Type I |
| | "I've decided that I don't want children because of my narcolepsy. All of my energy goes to going to work and making it [through] the day. I know it wouldn't be fair to have kids and do that." | Female, 28 Type I |
| | "She's a kid and doesn't completely understand, but it takes a toll on a mother/daughter relationship to an extent … I would like to be more present and more active with her." | Female, 33 Type I |
| | "I'm scared to pursue any intimate, personal relationships because of my cataplexy." | Female, 26 Type I |
| Impact on Occupational Functioning | "I would love to go back to work full-time, I just don't think it's doable." | Female, 32 Type I |
| | "The need [to sleep] is so strong that you think, well, I would rather lose my job and be homeless if I have to because I have to sleep." | Female, 31 Type I |
| | "I ruled out several different fields just because I thought that it was too much work and I would be too tired to do that work. So, I felt like I had to choose a somewhat easy path for myself." | Female, 28 Type II |

participants also remarked that the symptoms of narcolepsy affected their decisions regarding family planning or establishing relationships, noting fears of being "too tired to take care of children" or anxiety about not being able to take stimulant medications for narcolepsy symptoms during pregnancy and breastfeeding. Finally, narcolepsy prevented some people from working or achieving their occupational aspirations. One participant stated, "I ruled out several different fields because I thought that it was too much work and I would be too tired to do that work."

### *Challenges and barriers related to current treatments*

The second theme focused on the challenges and barriers to receiving quality care for narcolepsy in the current health care system (see Table 3). The most common sub-theme involved complaints that many health care providers who were not sleep specialists did not have adequate knowledge of narcolepsy. In particular, many comments were directed toward mental health providers, with one participant expressing frustration with spending "an hour in therapy explaining what narcolepsy is." Others expressed frustration related to "having to go to different doctors" to get diagnosed. The majority of participants reported seeing their sleep specialists every three to six months and most were satisfied with the medical management of narcolepsy symptoms, particularly when the sleep specialist had a background in neurology. Multiple participants described their sleep doctors as "supportive" and "empathetic." However, there were also those who felt that there was insufficient time to discuss all of their needs with a sleep specialist. Some complained that the doctor was "rushed" or only focused on medication management. A final sub-theme included difficulties with access to care in the current health care system. Comments included difficulties obtaining insurance approvals for medications, which led to one patient having to go several days without medication. Some participants also stated that they were "dropped" by doctors and therapists because they were unable to make it to appointments due to EDS. Others felt that the cost of seeing a specialist or mental health provider was too high, especially when the patient was unemployed.

### *Patient preferences for a psychosocial intervention*

Participants were asked to provide input on aspects of developing a psychosocial intervention for PWN, including the setting, content, provider type, and format (see Table 4). There were mixed opinions regarding whether the intervention should be delivered in a sleep clinic or a mental health clinic, but there was general enthusiasm to receive the intervention online or remotely due to the

**Table 3.** Barriers to receiving quality care for narcolepsy.

| Sub-Theme | Quote | Demographic |
|---|---|---|
| Inadequate Knowledge of Narcolepsy | "My therapist, she doesn't know a lot about narcolepsy … I've had to really force that piece into my mental health treatment." | Female, 28 Type II |
| | "It seems that you're gonna get either one or the other. You're gonna get a sleep specialist who knows a lot about narcolepsy and other sleep disorders, but they only have 10 minutes to talk to you. Or you're gonna get a therapist who knows a lot about depression, hypomania, and every other symptom and if it looks like narcolepsy, but they know nothing about narcolepsy." | Female, 31 Type I |
| | "I get so frustrated because I've spent an hour in therapy explaining what narcolepsy is on a physiological level." | Female, 31 Type I |
| Inadequate Time for Patient | "[The physician is] very just like facts only, like spends very little time really hearing me out. It's very, 'here's your prescription, I'll write it, go.'" | Female, 35 Type II |
| | "My doctor just seems very rushed because, as a specialist, he sees lots of people." | Female, 21 Type I |
| | "I was out of my Adderall and I had waited three months for this appointment so I just lost it. I just started bawling in the office and was like no, you need to help me now." | Female, 29 Type II |
| Accessibility of Treatment | "I've lost doctors because I couldn't ever make it … I won't wake up if I have nobody to call. I'll turn alarms off." | Female, 35 Type II |
| | "My old therapist actually dropped me because I couldn't ever make it" | Female, 26 Type II |
| | "It's just not being managed … my insurance won't approve anything to help me out." | Female, 21 Type I |

**Table 4.** Patient preferences for psychosocial treatment.

| Sub-Theme | Quote | Demographics |
|---|---|---|
| Setting | "I would say a sleep clinic. I don't know if like a mental health place would be the best." | Male, 29, Type I |
| | "I think it could be done online so that people like me could have access to it" | Female, 38, Type II |
| | "So, it could happen at a community health center, I think, would be the best place for it to start." | Female, 27, Type I |
| Format | "It's nice to see people in the same boat as me, but at the same time there's certainly things I'd like to discuss privately and that's why I go to my one-on-one therapy sessions … In a perfect world, both" | Female, 30, Type II |
| | "It makes you feel validated. And the only way we can really feel validated is with each other." | Female, 26, Type II |
| Provider Type | "I think a psychiatrist and a sleep specialist would be best. That way you have people who are coming up at it from different angles, I guess, when it comes to medication and managing it, etc." | Female, 28, Type I |
| | "I would prefer like a mental health professional because they've gone through years of training and have to understand the human brain in that capacity" | Female, 26, Type II |
| Content | "I feel it would be beneficial if sleep specialists would inquire about their patients' quality of life … while your symptoms might be managed, it can still be a nightmare to make sure they stay under control and they can really affect your psychological state of being" | Female, 21, Type I |
| | "Finding out what other people do and how they cope with it may actually improve yours or how you deal with your symptoms" | Male, 37, Type II |
| | "ways to cope on the job, ways to cope with your family, ways to cope in social situations and learning from the people who are doing it" | Female, 57, Type II |
| | "People to help with some of the behavioral aspects of narcolepsy" | Female, 28, Type I |
| | "Explain what narcolepsy is and what it feels like to other people." | Female, 28, Type II |

potential for increased accessibility. Similarly, there were mixed opinions about having individual sessions versus groups; some patients expressed a desire for social connection through groups while others expressed the belief that individual sessions would be more conducive to addressing individual needs. Opinions were also diverse with regard to the type of provider that should deliver this intervention. Some favored a mental health provider (e.g., psychologist, psychiatrist, social worker) while a few patients favored a sleep specialist, and some requested a provider who had training in both (e.g., behavioral sleep medicine clinician) or a multidisciplinary team approach. Patient input on the intervention content included information on coping strategies, symptom self-management strategies, education about narcolepsy, and cognitive therapy (see summary in Table 4).

## *Clinical measures*

All participants provided complete data on clinical measures and the findings are summarized in Table 5. The mean total score on the PHQ-9 was 15.79 (SD = 3.85), indicating moderately severe depression. Using the PHQ-9 cutoff scores, 38% (n = 11) reported moderate symptoms of depression, 41% (n = 12) reported moderately severe symptoms of depression, and 21% (n = 6) reported severe symptoms of depression. The average ESS total score was 22.45 (SD = 3.80), indicating a very high level of sleepiness. The SF-36 revealed a profile of relative reductions in health status on the following scales: role limitation due to emotional health, energy/fatigue, emotional well-being, and social functioning. In addition, the health change subscale indicated a relatively stable health status over the past year.

The PROMIS CATs used an average of 4.5 items (SD = 1.54) per scale to yield a T-score. Elevations were reported on the PROMIS scales for depression (T = 64.18, SEM = 2.69), anxiety (T = 66.34, SEM = 2.62), fatigue (T = 68.25, SEM = 2.50), and sleep impairment (T = 66.89, SEM = 2.51). These scores correspond to impairment in the moderate range (T-score > 60). Additionally, the observed mean score on PROMIS depression corresponds to a PHQ-9 score in the moderately severe range and a BDI-II score in the severe range based on previous validation

**Table 5.** Clinical measures.

| Measure | Type I | Type II | Total |
|---|---|---|---|
| PHQ (mean, SD) | 16.76 (3.91) | 14.42 (3.45) | 15.79 (3.85) |
| ESS (mean, SD) | 23.35 (3.77) | 21.17 (3.59) | 22.45 (3.80) |
| SF-36 (mean, SD) | | | |
| Physical Functioning | 66.47 (26.15) | 82.92 (13.05) | 73.28 (22.92) |
| Role limitations/Physical | 16.18 (26.43) | 25.69 (23.96) | 20.11 (25.44) |
| Role Limitations/Emotional | 7.84 (14.57) | 13.89 (22.29) | 10.34 (18.05) |
| Energy/Fatigue | 13.24 (9.83) | 15.42 (12.52) | 14.14 (10.86) |
| Emotional Well-Being | 43.53 (16.36) | 47.33 (16.34) | 45.10 (16.17) |
| Social Functioning | 37.50 (22.96) | 50.00 (25.00) | 42.67 (24.21) |
| Pain | 63.97 (24.08) | 74.17 (21.49) | 68.19 (23.21) |
| General Health* | 33.24 (18.79) | 49.17 (16.07) | 39.83 (19.16) |
| Health Change | 52.94 (23.19) | 64.58 (27.09) | 57.76 (25.09) |
| PROMIS (T-score, SEM) | | | |
| Depression | 65.89 (2.28) | 63.28 (2.25) | 64.81 (2.27) |
| Anxiety | 67.76 (2.66) | 64.33 (2.57) | 66.34 (2.62) |
| Fatigue | 69.21 (2.54) | 66.89 (2.45) | 68.25 (2.50) |
| Sleep Disturbance | 58.06 (2.82) | 56.94 (2.79) | 57.60 (2.81) |
| Sleep Impairment | 67.26 (2.57) | 66.37 (2.42) | 66.89 (2.51) |
| Pain Interference | 56.38 (2.40) | 49.93 (3.09) | 53.71 (2.69) |
| Physical Functioning | 43.51 (2.18) | 45.58 (2.18) | 44.36 (2.18) |

* $p < .05$

**Note**. PHQ = Patient Health Questionnaire; ESS = Epworth Sleepiness Scale; SF-36 = Short-Form 36-Item Health Survey; PROMIS = Patient-Reported Outcomes Measurement Information System; SD = Standard Deviation; SEM = Standard Error of Measure).

studies (Choi, Schalet, Cook, & Cella, 2014). Scores on sleep disturbance (T = 57.60, SEM = 2.81), pain interference (T = 53.71, SEM = 2.69), and physical functioning (T = 44.36, SEM = 2.18) corresponded to mild impairment (Cook, Schalet, Kallen, Rutsohn, & Cella, 2015; Schalet et al., 2015). See Figure 2 for more details.

Comparisons between patients with Narcolepsy Type I and Narcolepsy Type II revealed a general pattern of elevated symptoms among Type I relative to Type II. A significant difference was found on the SF-36 general health scale ($F = 5.68$, $p < .05$) with Type I (M = 33.24, SD = 18.79) reporting lower levels of general health relative to Type II (M = 49.17, SD = 16.07). No other significant results were found between groups on other clinical measures ($p > .05$).

## Discussion

This mixed-methods study revealed important patient-centered insights and specific health-related challenges that compromise HRQoL among PWN. Qualitative data from focus groups revealed specific areas of impairment and unique challenges that PWN face in managing their symptoms. The constancy of EDS was cited as a key factor in contributing to poor HRQoL. Consistent with this qualitative finding, elevations on clinical measures were observed on the ESS, PROMIS fatigue, and SF-36 energy/fatigue scales. In addition, the unpredictability of narcolepsy symptoms was another prominent factor that reduced HRQoL, particularly related to anxiety and social interactions. More specifically, those with Narcolepsy Type I reported that anxiety and avoidance related to having cataplexy in social situations had a negative impact on psychosocial functioning. The specific impact of cataplexy on psychosocial functioning could provide an explanation for the lower level of general health reported by PWN Type I on the SF-36. The comments from participants about the negative perception of narcolepsy provide qualitative insight into the association between health-related stigma and depression reported by Kapella et al. (2015). Moreover, the role limitations or reductions in functional capacity reported by participants in the focus groups appear to be related to low self-esteem and self-worth, corresponding to the impairments in social functioning and role limitations due to emotional health observed on the SF-36. Additionally, some study participants commented

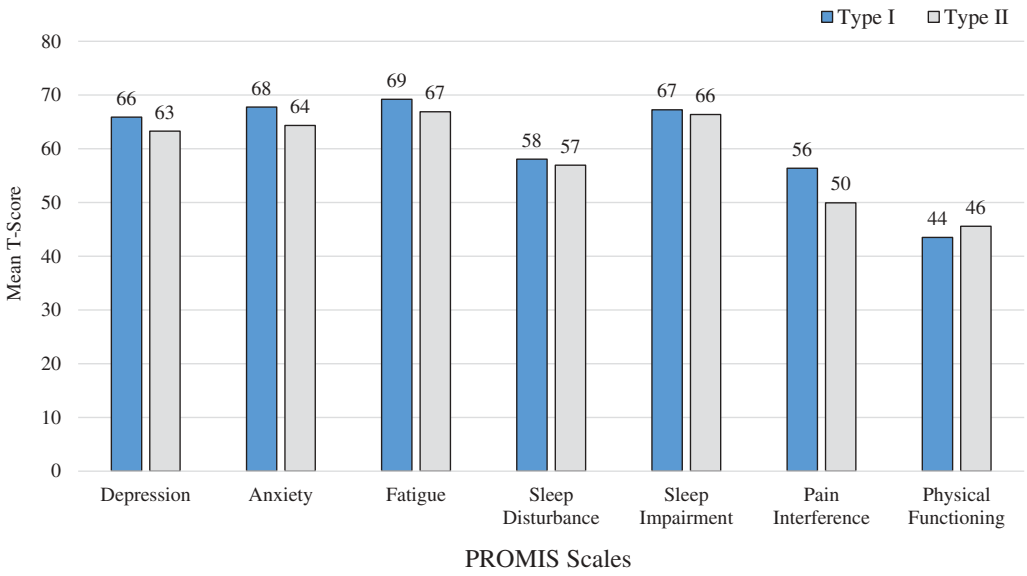


**Figure 2.** This figure provides a profile of the T-scores for Narcolepsy Type I and Type II across each of the seven PROMIS scales assessed in this study. T-scores are measured as the amount of the symptom being assessed where a higher score indicates a higher level of the symptom. The average T-score for the normal US population is 50, with a standard deviation of 10. The CAT used an average of 4.5 items per scale (SD = 1.54).

that narcolepsy led to different decisions related to family planning or career choices, and provided specific examples of reductions in social functioning. These findings are consistent with a previous study that found that 72% of PWN reported interpersonal distress, with 20% identifying narcolepsy as the reason for divorce or separation (Kales et al., 1982). The overall convergence of qualitative and quantitative data provides new context and details to explain how certain narcolepsy symptoms affect HRQoL, particularly with regards to psychosocial functioning.

PWN articulated shortcomings in the current health care system that created challenges and barriers to receiving appropriate care. The most prominent issue raised was providers' inadequate knowledge of and training in narcolepsy, particularly among mental health providers. Patients explained that this frustration often led them to seek different care providers until they were able to find someone who was able to accurately diagnose narcolepsy or understand the impact of the symptoms. This could be a factor contributing to the common delay in narcolepsy diagnosis that has been previously reported (Maski et al., 2017). Furthermore, the lack of rapport or trust in a mental health provider could explain why current mental health treatments are not effective at improving psychosocial functioning. Another key challenge was access to care, typically due to the unpredictability of symptoms and the cost of narcolepsy-related care. This points to potential opportunities in delivering programs outside of medical clinics and highlights the importance of considering cost-effectiveness when delivering care.

These findings can be used to inform clinical care for PWN and guide further clinical research toward an intervention study. First, self-esteem and self-efficacy appear to be modifiable behavioral risk factors that can serve as potential targets for psychosocial intervention. Specific work in this area could address the stigma related to narcolepsy through training in coping strategies, education about narcolepsy, and training in assertive communication about narcolepsy. These techniques have been used previously in other clinical populations where stigma has a negative impact on HRQoL (e.g., people with HIV/AIDS, leprosy, and epilepsy) (Heijnders & Van Der Meij, 2006). A second important target is anxiety, which appears to be related to the unpredictable nature of narcolepsy symptoms or avoidance of certain situations due to narcolepsy symptoms. Strategies such as

mindfulness or acceptance-based techniques could be particularly useful to address anxious thoughts and reactions reported by patients in this study. In particular, these strategies could be used to manage anxious thoughts and avoidance related to cataplexy for PWN Type I. Third, the findings highlight the need to appropriately educate and train non-sleep specialists to understand the impact of narcolepsy symptoms and the unique challenges in working with PWN. This is an important consideration for any psychosocial intervention where establishing rapport and trust between the provider and patient is crucial. Finally, internet delivery or telehealth models should be considered in both research and clinical settings to address patient concerns about accessibility and cost.

This study also provided support for the feasibility of using PROMIS instruments as patient-reported outcome measures in narcolepsy studies or in the context of clinical care. In general, there was congruence between the PROMIS measures and the legacy measures, with the collective profile showing elevations in symptoms of depression, anxiety, and sleepiness/fatigue. Many of these elevations were in the moderate to moderately severe range compared to the original validation samples as well as to individuals with chronic diseases (Jensen et al., 2017; Rothrock et al., 2010). Scores on the PROMIS depression scale corresponded closely with scores on the PHQ-9, with both scales indicating moderately-severe elevations on depressive symptoms. Elevations on the PROMIS anxiety scale were in the moderate range (T-score = 67.73) and were above the recommended cutoff score of 62.3 for generalized anxiety disorder based on validation studies comparing the PROMIS anxiety scale to legacy measures for anxiety (Schalet, Cook, Choi, & Cella, 2014; Schalet et al., 2016). Furthermore, all participants provided complete data and required only an average of 4.5 items per scale. These features indicate that PROMIS CATs can yield reliable results while minimizing participant burden, an important consideration for assessing PWN where difficulties with concentration and fatigue preclude long assessment batteries. These findings extend what is currently known regarding the clinical validity of PROMIS measures in chronic conditions (Cook et al., 2016) and provide preliminary evidence indicating that PROMIS may be an appropriate and efficient assessment tool for patient-reported outcomes in PWN.

The findings in this study should be considered within the context of limitations. First, this was a relatively small sample size for quantitative analyses, which could limit the ability to detect differences between Narcolepsy Type I and Narcolepsy Type II. Second, the generalizability of these findings could be compromised by the source of recruitment (primarily via social media from one patient organization), the small number of males (n = 2), and exclusion of those who did not have access to live videoconferencing (possible selection bias against individuals from lower socioeconomic status groups). Third, the interpretation of the PROMIS scores for PWN should be made with caution, as this study was not specifically designed to validate the PROMIS measures for narcolepsy and we are not aware of any other published studies using PROMIS for this population to compare our findings. Therefore, further research is needed to determine the clinical significance of the T-scores and meaningful change with treatment for PWN.

In summary, the present study provides important patient-centered perspectives into the impact of narcolepsy on HRQoL. These findings revealed shortcomings in the current health-care system that can serve as targets for educating non-sleep specialists and improving treatment accessibility for PWN. For researchers, the findings can inform the development and delivery of a psychosocial intervention for narcolepsy. For clinicians, these findings identify important gaps in supportive care for PWN. PROMIS CATs appear to be suitable and efficient instruments for assessing HRQoL among PWN, and should be considered for further testing in future clinical studies with this population. Collectively, these findings lay the groundwork for more targeted efforts to address areas of diminished HRQoL in PWN.

## Acknowledgments

This project was funded by a grant from Wake Up Narcolepsy.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

This work was supported by Wake Up Narcolepsy.

## ORCID

Jason C. Ong http://orcid.org/0000-0002-7571-6738

## References

Antic, N. A., Catcheside, P., Buchan, C., Hensley, M., Naughton, M. T., Rowland, S., … McEvoy, R. D. (2011). The effect of CPAP in normalizing daytime sleepiness, quality of life, and neurocognitive function in patients with moderate to severe OSA. *Sleep*, *34*(1), 111–119. doi:10.1093/sleep/34.1.111

Black, J., Reaven, N. L., Funk, S. E., McGaughey, K., Ohayon, M., Guilleminault, C., … Mignot, E. (2014). The Burden of Narcolepsy Disease (BOND) study: Health-care utilization and cost findings. *Sleep Medicine*, *15*(5), 522–529. doi:10.1016/j.sleep.2014.02.001

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. doi:10.1191/1478088706qp063oa

Choi, S. W., Schalet, B., Cook, K. F., & Cella, D. (2014). Establishing a common metric for depressive symptoms: Linking the BDI-II, CES-D, and PHQ-9 to PROMIS depression. *Psychological Assessment*, *26*(2), 513–527. doi:10.1037/a0035768

Cook, K. F., Jensen, S. E., Schalet, B. D., Beaumont, J. L., Amtmann, D., Czajkowski, S., … Cella, D. (2016). PROMIS measures of pain, fatigue, negative affect, physical function, and social function demonstrated clinical validity across a range of chronic conditions. *Journal of Clinical Epidemiology*, *73*, 89–102. doi:10.1016/j.jclinepi.2015.08.038

Cook, K. F., Schalet, B. D., Kallen, M. A., Rutsohn, J. P., & Cella, D. (2015). Establishing a common metric for self-reported pain: Linking BPI pain interference and SF-36 bodily pain subscale scores to the PROMIS pain interference metric. *Quality of Life Research : an International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, *24*(10), 2305–2318. doi:10.1007/s11136-015-0987-6

Czajkowski, S. M., Powell, L. H., Adler, N., Naar-King, S., Reynolds, K. D., Hunter, C. M., … Charlson, M. E. (2015). From ideas to efficacy: The ORBIT model for developing behavioral treatments for chronic diseases. *Health Psychology*, *34*(10), 971–982. doi:10.1037/hea0000161

Daniels, E., King, M. A., Smith, I. E., & Shneerson, J. M. (2001). Health-related quality of life in narcolepsy. *Journal of Sleep Research*, *10*(1), 75–81. doi:10.1046/j.1365-2869.2001.00234.x

Dauvilliers, Y., Paquereau, J., Bastuji, H., Drouot, X., Weil, J. S., & Viot-Blanc, V. (2009). Psychological health in central hypersomnias: The French Harmony study. *Journal of Neurology, Neurosurgery, and Psychiatry*, *80*(6), 636–641. doi:10.1136/jnnp.2008.161588

Dodel, R., Peter, H., Spottke, A., Noelker, C., Althaus, A., Siebert, U., … Mayer, G. (2007). Health-related quality of life in patients with narcolepsy. *Sleep Medicine*, *8*(7), 733–741. doi:10.1016/j.sleep.2006.10.010

Ervik, S., Abdelnoor, M., Heier, M. S., Ramberg, M., & Strand, G. (2006). Health-related quality of life in narcolepsy. *Acta Neurologica Scandinavica*, *114*(3), 198–204. doi:10.1111/ane.2006.114.issue-3

Flores, N. M., Villa, K. F., Black, J., Chervin, R. D., & Witt, E. A. (2016). The humanistic and economic burden of narcolepsy. *Journal of Clinical Sleep Medicine: JCSM: Official Publication of the American Academy of Sleep Medicine*, *12*(3), 401–407. doi:10.5664/jcsm.5594

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377–381. doi:10.1016/j.jbi.2008.08.010

Heijnders, M., & Van Der Meij, S. (2006). The fight against stigma: An overview of stigma-reduction strategies and interventions. *Psychology, Health & Medicine*, *11*(3), 353–363. doi:10.1080/13548500600595327

Jensen, R. E., Potosky, A. L., Moinpour, C. M., Lobo, T., Cella, D., Hahn, E. A., … Reeve, B. B. (2017). United States population-based estimates of patient-reported outcomes measurement information system symptom and functional status reference values for individuals with cancer. *Journal of Clinical Oncology*, *35*(17), 1913–1920. doi:10.1200/jco.2016.71.4410

Johns, M. W. (1991). A new method for measuring daytime sleepiness: The Epworth sleepiness scale. *Sleep*, *14*(6), 540–545. doi:10.1093/sleep/14.6.540

Johns, M. W. (1993). Daytime sleepiness, snoring, and obstructive sleep apnea. The Epworth sleepiness scale. *Chest*, *103*(1), 30–36. doi:10.1378/chest.103.1.30

Kales, A., Soldatos, C. R., Bixler, E. O., Caldwell, A., Cadieux, R. J., Verrechio, J. M., & Kales, J. D. (1982). Narcolepsy-cataplexy: II. Psychosocial consequences and associated psychopathology. *Archives of Neurology*, *39*(3), 169–171. doi:10.1001/archneur.1982.00510150039009

Kapella, M. C., Berger, B. E., Vern, B. A., Vispute, S., Prasad, B., & Carley, D. W. (2015). Health-related stigma as a determinant of functioning in young adults with narcolepsy. *PloS One*, *10*(4), e0122478. doi:10.1371/journal.pone.0122478

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. doi:10.1046/j.1525-1497.2001.016009606.x

Lai, J. S., Cella, D., Choi, S., Junghaenel, D. U., Christodoulou, C., Gershon, R., & Stone, A. (2011). How item banks and their application can influence measurement practice in rehabilitation medicine: A PROMIS fatigue item bank example. *Archives of Physical Medicine and Rehabilitation*, *92*(10 Suppl), S20–27. doi:10.1016/j.apmr.2010.08.033

Maski, K., Steinhart, E., Williams, D., Scammell, T., Flygare, J., McCleary, K., & Gow, M. (2017). Listening to the patient voice in narcolepsy: diagnostic delay, disease burden, and treatment efficacy. *Journal of Clinical Sleep Medicine : JCSM : Official Publication of the American Academy of Sleep Medicine*, *13*(3), 419–425. doi:10.5664/jcsm.6494

Morgan, D. L. (1996). *Focus groups as qualitative research* (Vol. 16). Thousand Oaks, CA: Sage publications.

Neikrug, A. B., Crawford, M. R., & Ong, J. C. (2016). Behavioral sleep medicine services for hypersomnia - A survey study. *Behavioral Sleep Medicine, 15(2),* 158–171.

Ohayon, M. M. (2013). Narcolepsy is complicated by high medical and psychiatric comorbidities: A comparison with the general population. *Sleep Medicine*, *14*(6), 488–492. doi:10.1016/j.sleep.2013.03.002

Ozaki, A., Inoue, Y., Nakajima, T., Hayashida, K., Honda, M., Komada, Y., & Takahashi, K. (2008). Health-related quality of life among drug-naive patients with narcolepsy with cataplexy, narcolepsy without cataplexy, and idiopathic hypersomnia without long sleep time. *Journal of Clinical Sleep Medicine: JCSM: Official Publication of the American Academy of Sleep Medicine*, *4*(6), 572–578.

Rothrock, N. E., Hays, R. D., Spritzer, K., Yount, S. E., Riley, W., & Cella, D. (2010). Relative to the general US population, chronic diseases are associated with poorer health-related quality of life as measured by the patient-reported outcomes measurement information system (PROMIS). *Journal of Clinical Epidemiology*, *63*(11), 1195–1204. doi:10.1016/j.jclinepi.2010.04.012

Rounsaville, B. J., Carroll, K. M., & Onken, L. S. (2001). A stage model of behavioral therapies research: Getting started and moving on from stage I. *Clinical Psychology: Science and Practice*, *8*(2), 133–142.

Schalet, B. D., Cook, K. F., Choi, S. W., & Cella, D. (2014). Establishing a common metric for self-reported anxiety: Linking the MASQ, PANAS, and GAD-7 to PROMIS anxiety. *Journal of Anxiety Disorders*, *28*(1), 88–96. doi:10.1016/j.janxdis.2013.11.006

Schalet, B. D., Pilkonis, P. A., Yu, L., Dodds, N., Johnston, K. L., Yount, S., … Cella, D. (2016). Clinical validity of PROMIS depression, anxiety, and anger across diverse clinical samples. *Journal of Clinical Epidemiology*, *73*, 119–127. doi:10.1016/j.jclinepi.2015.08.036

Schalet, B. D., Revicki, D. A., Cook, K. F., Krishnan, E., Fries, J. F., & Cella, D. (2015). Establishing a common metric for physical function: Linking the HAQ-DI and SF-36 PF subscale to PROMIS((R)) physical function. *Journal of General Internal Medicine*, *30*(10), 1517–1523. doi:10.1007/s11606-015-3360-0

Ware, J. E., Jr., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical Care*, *30*(6), 473–483. doi:10.1097/00005650-199206000-00002