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Original article



## Social support predicts sleep quality in people with multiple sclerosis during the COVID-19 pandemic

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### ABSTRACT

**Background:** Poor sleep quality is one of the most prominent patient-reported problems in people with multiple sclerosis (PwMS). The COVID-19 pandemic resulted in PwMS having less contact with physicians, therapists, support groups, and family, which led to decreased access to typical supports. The purpose of this study was to assess how social support impacted sleep quality during the COVID-19 pandemic in PwMS within the United States.

**Methods:** Anonymous surveys were utilized to gather data from February – May 2021 from 209 PwMS during their return appointments (face-to-face and virtual) at the University of Kansas Medical Center (KUMC)'s MS Clinic in the United States. SPSS 27 was used to run four regressions in order to determine if social support predicted sleep quality with and without the inclusion of covariates (age, education, disability, anxiety/depression).

**Results:** The results indicate that overall feelings of being socially supported predict sleep quality. Additionally, various facets of social support predict sleep quality, even when controlling for covariates. Interestingly, while depression and anxiety were significant predictors of sleep quality, those constructs do not attenuate the social support—sleep relationship.

**Conclusion:** These findings will provide key information pertaining to the association between social support and sleep in PwMS during COVID-19 where typical supports were limited. Understanding the challenges facing those living with chronic illnesses, specifically PwMS, will help researchers and clinicians alike create interventions to promote social support in the midst of a global pandemic.

## 1. Introduction

Multiple sclerosis (MS), an autoimmune disorder affecting the central nervous system, causes a decline in physical and cognitive function that can impact quality of life and psychosocial functioning, such as ability to work and participate in leisure activities (Poser and Brinar, 2004; Schapiro, 2005). Poor sleep quality is one of the most prominent patient-reported problems in PwMS, with up to 70% reporting poor sleep quality (Mikula et al., 2020). Poor sleep quality can result from lesions caused by MS or from comorbid conditions (e.g anxiety, depression, pain, bladder dysfunction; Mikula et al., 2020; Ferrarelli et al., 2019; Vitkova et al., 2014). PwMS with good sleep quality have

higher physical functional abilities and better memory compared to those with worse sleep quality (Siengasukon et al., 2018). Social support is also an important factor contributing to sleep quality (Grey et al., 2020; Hasler and Troxel, 2010).

Social support refers to the experience of being cared for emotionally and physically by another person or persons (Taylor, 2011). Social support can take place in varying forms (e.g., phone calls; Coleman and Iso-Ahola, 1993) and can have many benefits, including encouraging positive behaviors (Pearson, 1986), maintaining self-care (Graven and Grant, 2014), and enhancing quality of life (Gielen et al., 2001). Increased presence of social support is associated with better mental health (Cohen, 2004).

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A new coronavirus disease (COVID) was first detected in December 2019 and caused a global pandemic (Pantell and Shields-Zeeman, 2020). To reduce spread of the virus, preventative measures (i.e., quarantines, stay-at-home orders, social distancing) were implemented in many countries, including the United States. In-person activities were restricted and social distancing was encouraged. This stay-at-home request led to worse sleep quality in PwMS (Andreu-Caravaca et al., 2021), which further impacted mental health, work, and leisure (Mikula et al., 2020). The pandemic also lessened contact with physicians, therapists, support groups, and visits with family (Matten et al., 2020). Furthermore, lack of support from others exacerbated feelings of isolation throughout the pandemic across populations (Pantell and Shields-Zeeman, 2020).

In PwMS, social support has been shown to be a predictor of good physical health (Kroavcova et al., 2008). However, social support from in-person interaction was limited during the pandemic, such that typical day-to-day encounters with non-family members became rare. This change led to more feelings of loneliness and higher susceptibility to morbidity in general populations (Pantell and Shields-Zeeman, 2020). Further, disruption in treatment and practice in this population caused excess worry during the COVID-19 pandemic (Mateen et al., 2020). Sleep disturbances and increased fatigue was also reported among PwMS (Stojanov et al., 2021).

While previous research highlights the impact of social support on sleep (Grey et al., 2020; Kent de Grey et al., 2018; Pow et al., 2017), it is not understood how social support impacts sleep specifically in PwMS within the context of a global pandemic. Therefore, the purpose of this study was to investigate how social support impacted sleep quality during the COVID-19 pandemic in PwMS. We hypothesized that social support would promote sleep quality in PwMS during the COVID-19 pandemic.

## 2. Methods

### 2.1. Participants/procedures

Anonymous surveys were utilized to gather data from February – May 2021 from 209 PwMS during their return appointments (face-to-face and virtual) at the University of Kansas Medical Center (KUMC)'s MS Clinic in the United States. Participants completed a paper-and-pencil version of the survey during their clinic appointment or took it at home and returned it by mail. Those seen virtually were provided a link to access the survey in Research Electronic Data Capture (REDCap; Patridge and Bardyn, 2018). Participants were invited to participate in this study if they met the following criteria: able to read and write English fluently; definite diagnosis of MS by the 2017 McDonald Criteria (Carroll, 2018); 18 years and older; and able to complete the survey independently.

### 2.2. Measures

Type of MS and disease duration were reported by participants. The Patient Determined Disease Determined Steps (PDDS), The Hospital Anxiety and Depression Scale (HADS), the Modified MOS Social Support Survey (MSSS), and the Pittsburgh Sleep Quality Index (PSQI) were also completed.

#### 2.1.1. Patient Determined Disease Steps (PDDS)

PDDS is a self-report scale that assesses disability in patients with MS (Hohol et al., 1999). The scale outlines eight options for patients to answer regarding their disability status, with 0 = normal to 8 = bedridden).

#### 2.1.2. Hospital Anxiety and Depression Scale (HADS)

The HADS scale is a 14 items self-reported questionnaire administered to assess anxiety and depression in healthcare settings (Zigmond

and Snaith, 1983). The measure categorizes answers into having 'mild', 'moderate', or 'severe' anxiety and depression, which is contingent on the answers obtained when completing the scale.

#### 2.1.3. MS Social Support (MSSS)

The MSSS consists of 20 items that are separated into four subscales (i.e., emotional/information, affectionate, tangible, positive social interaction) that measure social support (Sherbourne and Stewart, 1991). Emotional/informational support is a subscale that measures emotional and conversational intimacy. Affectionate support is a subscale that measures physical touch and expression. Tangible support is a subscale that measures help with daily tasks or chores from others. Positive social interaction support is a subscale that measures leisure activities with others.

#### 2.1.4. Sleep quality (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) is a 19 item scale that assesses different dimensions of sleep (Buysse et al., 1989). Good internal homogeneity (Grandner et al., 2006), high test re-test reliability (Backhaus et al., 2002), and internal consistency (Sitasuwan et al., 2014) make this scale the gold standard for sleep quality measurement. The higher the cumulative score, the worse sleep quality experienced by the patient. A score less than 5 indicates good sleep quality.

#### 2.1.5. Statistical analysis

Analyses were conducted using SPSS 27. Demographics were analyzed using means and frequencies. Four linear regressions were used to determine if social support predicted sleep quality with and without the inclusion of covariates (age, education level, disability status, anxiety/depression). Multicollinearity was assessed and Variation Inflation Factors (VIF) was < 5 indicating limited correlation between variables (O'Brien, 2007). Total social support was used as the predictor, and PSQI was used as the outcome variable in Model 1. In Model 2, the social support subscales (i.e., emotional/informational, affectionate, tangible, and positive social interaction) were predictors of PSQI. Model 3 used the same variables as Model 2 and adjusted for age, education level, and disability status. Model 4 used the same variables as Model 2 and adjusted for age, education level, disability status, and anxiety/depression (HADS). Alpha was set at 0.05.

## 3. Results

### 3.1. Sample characteristics

A total of 209 PwMS responded to the survey. Forty-six individuals were removed from data analysis due to not completing the PSQI. The sample included in data analysis was 163 individuals. Table 1 contains descriptive statistics for the sample. Participants ( $n = 163$ , 70.6% female) ranged in age from 18 to 86+ years. The majority of respondents (57%) reported having a college degree. Most participants (79.8%) reported being diagnosed with relapsing remitting MS. Nearly half of respondents (47%) reported no- to- mild physical disability. The mean global PSQI score was 7.23,  $SD = .035$  and the majority of participants were poor sleepers (67%;  $PSQI < 5$ ; Buysse et al., 1989).

In Model 1, total social support significantly predicted PSQI ( $R^2 = .095$ ,  $p < .001$ ) with higher feelings of being socially supported associated with better sleep quality (Table 2). In Model 2, the social support subscales significantly predicted PSQI ( $R^2 = .166$ ,  $p < .001$ ), with emotional/informational support ( $p < .05$ ), tangible support ( $p < .05$ ), and positive social interaction support ( $p < .05$ ) significantly predicting PSQI. In Model 3, when adjusting for age, education, and disability ( $R^2 = .226$ ,  $p < .001$ ), PSQI was predicted by tangible support ( $p < 0.01$ ), and positive social interaction support ( $p < .01$ ), but not affectionate support ( $p = .381$ ), or emotional/informational support ( $p = .38$ ). In Model 4, HADS scores were included as a covariate along with age, education, and disability ( $R^2 = .347$ ,  $p < .01$ ). Tangible support ( $R^2 =$

**Table 1**  
Descriptive statistics.

Sample Characteristics	n(%)
<b>Age</b>	
18–25	3(2)
26–30	7(4)
31–35	14(8)
36–40	14(8)
41–45	21(11)
46–50	17(9)
51–55	26(14)
56–60	22(12)
61–65	20(11)
66–70	8(4)
71–75	4(2)
76–80	4(2)
81–85	0(0)
86+	1(.5)
Missing	22(12)
<b>Disability Status</b>	
Normal	65(36)
Mild disability	20(11)
Moderate disability	11(6)
Gait disability	19(11)
Early cane	16(9)
Late cane	10(6)
Bilateral support	8(4)
Wheelchair/scooter	6(3)
Missing	27(14)
<b>Gender</b>	
Female	114(62)
Male	40(22)
<b>Education</b>	
Did not complete high school	2(1)
High school graduate	19(11)
Some college	47(26)
Graduate of a 4 year college	62(34)
Graduated with a professional degree	33(18)
<b>Global PSQI</b>	
Good sleepers (PSQI > 5)	140(67)
Poor sleepers (PSQI < 5)	69(33)

.114,  $p < .01$ ), and positive social interaction support ( $R^2 = .114$ ,  $p < .05$ ) remained significant predictors of sleep quality with the addition of the HADS covariate.

**4. Discussion**

This is the first study, to our knowledge, to investigate how social support affected sleep quality in PwMS during the COVID-19 pandemic. The results indicate that facets of social support predict sleep quality, even when controlling for covariates. This showed that overall presence of social support (e.g., peers, friends, family) may promote quality of sleep. Given that better sleep quality enhances cognitive functioning (Martindale et al., 2017), physical health (Tanaka et al., 2002), and improved memory (Ferrarelli et al., 2019), these findings provide critical insight on the health-related consequences of social interactions in PwMS during a time when typically available supports were limited.

The findings that social support (Model 1) and the subscales of the MSSS (emotional/ informational, tangible, affectional, and positive social interaction (Model 2) predict sleep quality is perhaps not surprising considering that prior studies have found similar association (Kent de Grey et al., 2018; Xiao et al., 2020; Grey et al., 2020). Interestingly, both tangible social support and positive social interaction (Model 3) remained significant even after controlling for covariates, thus concluding that age, education level, and disability status do not attenuate the social support—sleep relationship. With the addition of depression and anxiety (Model 4), both tangible social support and positive social interaction continued to remain significant. This supports the notion that depression and anxiety do not further influence the social support—sleep relationship. Interestingly, this confirms that the social

**Table 2**  
Linear regressions for all study variables.

	Unstandardized Coefficients		Standardized Coefficients		Sig. (p)	R <sup>2</sup>
	B	SE	β	t		
<b>Model 1</b>						
MSSS Total	-1.162	2.98	-.308	-3.897	<.001	.095
<b>Model 2</b>						
Emotional/informational SS	-1.223	.564	-.331	-2.167	0.032	.166
Tangible SS	1.004	.413	.284	2.432	.016	
Affectionate SS	.469	.519	.133	.904	.367	
Positive Soc. Interaction SS	-1.260	.551	-.368	-2.285	.024	
<b>Model 3</b>						
Emotional/informational SS	-1.184	.566	-.323	-2.091	0.38	<.001
Tangible SS	1.326	.419	.378	3.166	.002	.226
Affectionate SS	.458	.520	.135	.879	.381	
Positive Soc. Interaction SS	-1.631	.547	-.491	-2.979	.003	
Age	-.227	.119	-.157	-1.903	.059	
Education	-.109	.288	-.030	-.379	.706	
Disability Status	-.033	.144	-.019	-.228	.820	
<b>Model 4</b>						
Emotional/informational SS	-.448	.541	-.123	-.829	.408	.008
Tangible SS	1.223	.386	.349	3.165	.002	.347
Affectionate SS	.106	.484	.031	.218	.827	
Positive Soc. Interaction SS	-1.243	.510	-.374	-2.437	.016	
Age	-.033	.116	-.023	-.287	.774	
Education	-.008	.266	-.002	-.029	.977	
Disability Status	-.076	.133	-.044	-.576	.565	
HADS	.236	.046	.418	5.15	<.001	

Note: A Linear Regression Model (Model 1,  $n = 168$ ), Multiple Regression Models (Model 2-4,  $n = 168$ ), Predicting Sleep Quality. HADS=Hospital Anxiety and Depression Scale.

support—sleep relationship is strong regardless of depression and anxiety levels. As a result, we can conclude that this linkage can potentially serve as a protective factor against depression and anxiety. However, depression and anxiety were significant predictors of sleep quality. Consistent with previous literature, the association between anxiety and depression with sleep, respectively, are well-established (Lee et al., 2016; Siengsukon et al., 2018).

These outcomes highlight the need to understand the unique facets of social support and how their roles differ in predicting sleep quality. In particular, positive social interaction and tangible social support subscales, respectively, were associated with better sleep quality regardless of age, education level, disability status, anxiety, or depression. Taking an active stance in helping with responsibilities, as well as offering services or providing resources are just a few of the ways to show support tangibly. Having positive interactions with peers and colleagues daily, as well as engaging in meaningful conversations exemplify ways to promote positive social interaction. While engaging in these types of activities could be challenging amid an infection disease outbreak, current technologies allow us to safely interact with others virtually. Coordinating online game nights or hosting group video streaming events are just a few of the many ways to promote positive social interactions while practicing social distancing.

There are many strengths to this study. First, our research question is timely to recent global events. Second, our study reflects MS treatment plans during COVID-19 that adhere to restrictions set by the Center for Disease Control (CDC). Given that the overwhelming majority (88%) of MS-related care has been moved to teleservices (Portaccio et al., 2021), there is a need to better understand the experience of living with this diagnosis during a time when typical treatments and supports had to be altered unexpectedly.

#### 4.1. Limitations and future directions

Understanding the role of social support helps us assess the types of relationship that can improve overall health. Short- and long-term health outcomes can be dependent on social relationships (Umberson and Montez, 2010); given that social connectedness is a universal human experience, it is important to investigate the unique ways that humans connect with one another, and its function for our sleep health. COVID-19 made this particularly interesting because of the limited in-person interactions. Studies show the more social support available during the pandemic increased well-being levels (Wu et al., 2021). This leads to a major limitation in the study surrounding generalizability among populations. We also noticed a lack of wealth in the literature surrounding studies that explore how social and emotional supports can have a positive impact on sleep during COVID-19, particularly in PwMS who are comparable age-wise to our sample. MS affects people throughout the lifespan, often developing after adolescence or during early adulthood (Spencer et al., 2019). Future researchers should continue to investigate these psychosocial constructs amid a global pandemic, particularly in younger samples of PwMS. Since these populations are more susceptible to experiencing greater negative affect during unprecedented times, such as the COVID-19 pandemic (Groarke et al., 2020), it is critical that research surrounding this population continues in order to improve quality of life. Given that sleep health is linked to physical health (Tanaka et al., 2002) and cognitive functioning (Martindale et al., 2017), preserving and promoting sleep in this population is crucial. Furthermore, given the unique circumstances surrounding the pandemic, it is increasingly important for the public to understand the health-related consequences of social support. Given the lack of causality, future researchers should consider adapting this study to an experimental or longitudinal design. This will help further decipher causation directly. The intersection of systematic and socioeconomic factors should also be considered when replicating this study. Experiences related to social class, economic status, and multicultural identity can further influence support socially and sleep, respectively. The effects of social issues (e.g., racism, sexism) can affect sleep outcomes (Grandner et al., 2012), thus making it important for these constructs to be considered when assessing the social support—sleep relationship.

#### 5. Conclusion

This study demonstrates how social support predicts sleep quality in PwMS during the most recent global pandemic, COVID-19. PwMS are faced with unique challenges, including the adaptation of treatments to meet changing needs that is contingent on the current status of disability. Likewise, it is of utmost importance that both social support and sleep are taken into consideration when investigating how to improve daily living within the context of a pandemic, specifically in PwMS.

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#### CRediT authorship contribution statement

**Taylor P. Harris:** Investigation, Formal analysis, Writing – original draft, Writing – review & editing. **Lauren M. Zaeske:** Formal analysis, Writing – original draft, Writing – review & editing, Writing – review & editing. **Rebecca Ludwig:** Formal analysis, Writing – original draft, Writing – review & editing. **Sara Baker:** Conceptualization, Writing – review & editing. **Sharon Lynch:** Conceptualization, Writing – review & editing. **Amanda Thuringer:** Conceptualization, Writing – review & editing. **Jared Bruce:** Conceptualization, Writing – review & editing.

**Catherine F. Siengasukon:** Conceptualization, Writing – review & editing.

#### Declaration of Competing Interest

Jared Bruce received funding from Genzyme and MediQ. He is a grantee of the National MS Society. Catherine F. Siengasukon is the owner and CEO of Sleep Health Education, LLC.

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