

Persisting Psychosocial Impairments in Adults Being Treated with Medication for Attention Deficit/Hyperactivity Disorder

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BACKGROUND

- Attention-deficit/hyperactivity disorder (ADHD) is a common neurobehavioral condition in childhood.¹ Of the 3–10% of children diagnosed with ADHD, it is thought that approximately one- to two-thirds (1–6% of the general population) will continue to have ADHD symptoms in adult life¹
- According to the American Psychiatric Association's Diagnostic and Statistical Manual, fifth edition (DSM-5), ADHD is characterized by a persistent pattern of inattention, hyperactivity, and impulsivity that interferes with functioning or development²
- In general, adults diagnosed with ADHD have been shown to have more impairments related to their work/school and social lives than matched samples of adults without ADHD.^{3–8} These impairments are key components of the diagnosis of ADHD, according to the DSM-5.² Symptoms necessary for this diagnosis include impairments in interpersonal communication, irritability/mood, lability, and cognition (including attention, executive function, or memory)²
- Various scales and instruments, such as the Behavior Rating Inventory of Executive Function-Adult version (BRIEF-A) assessments or the Brown Attention-Deficit Disorder Scale (BADDS), have also been used to assess the impairments in functioning commonly associated with ADHD^{9–11}

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- However, these scales and DSM-5 criteria may not fully characterize the manifestation of adult ADHD symptoms in the work/school, home, and/or social settings across all times of the day
- In addition, the degree of impairment in daily life experienced by adults with ADHD being treated with medication has not been well characterized³

OBJECTIVE

- The aim of this study was to characterize the type and degree of impairments in daily life of adults reporting ADHD who are also being treated with pharmacotherapy. To characterize the true burden of ADHD, the daily life impairments were compared with those reported by a general-population sample of adults without ADHD

METHODS

- A cross-sectional, online survey was conducted among adults who reported ADHD and among adults without ADHD (normative sample)
- The online survey was developed following a series of qualitative interviews with adults who have ADHD (n = 31) used to elicit concepts and impairments specific to the ADHD population
- After providing informed consent, the participants were interviewed by a trained interviewer who used a semistructured interview guide to elicit information regarding the participants' experiences with ADHD, focusing on identifying burden and unmet needs
- A draft survey was then tested on a small sample of adults with ADHD (n = 5) using cognitive interviewing methodology, and the content of the survey was finalized based on the feedback received

Participant Selection

- Participants were recruited in the United States through research participant panels, according to the International Review Board-approved protocol
- Participants with ADHD and those without ADHD (normative) were eligible to be included in the study if they met all the respective criteria at the time of screening (Table 1)
- Non-ADHD (normative) participants were recruited to match the ADHD sample with regard to gender

TABLE 1

ENTRY CRITERIA

ADHD PARTICIPANTS

- Patient-reported diagnosis of ADHD
- Aged 18 years or older
- Currently taking at least one prescription medication indicated for ADHD and began taking it at least 6 months prior to screening
- Adequate written and oral fluency in English
- Willing to provide informed consent
- Access to the Internet
- Able to comply with the study procedures

NON-ADHD (NORMATIVE) PARTICIPANTS

- Aged 18 years or older
- No diagnosis of ADHD
- Not currently taking any prescription medication indicated for ADHD
- Adequate written and oral fluency in English
- Willing to provide informed consent
- Access to the Internet
- Able to comply with the study procedures

- Participants received financial remuneration for the time spent completing the survey

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Online Survey

- Both normative (non-ADHD) participants and those with treated ADHD were asked questions relating to their everyday life challenges
- Participants reporting ADHD completed a 30-minute online survey. The survey included sociodemographic and clinical questions, along with questions relating to the participants' experiences with ADHD treatment and their everyday activities
- The normative participants completed a shorter version of the online survey, which lasted approximately 15 minutes. The survey included sociodemographic questions and questions related to everyday activities

Data Analysis

- Descriptive statistics were calculated for each survey question: mean with standard deviation (SD) or standard error (SE) for normally distributed continuous data; median with range and/or interquartile range for non-normally distributed continuous data; and frequency with percentages for categorical data
- The statistical significance of differences between ADHD and non-ADHD subgroups was assessed using independent sample t-tests or Mann-Whitney tests for comparing normally and non-normally distributed continuous data, respectively. Chi-squared tests were used to compare categorical data

RESULTS

Participant Characteristics

- A total of 616 adults with ADHD treated with pharmacotherapy and 200 non-ADHD (normative) adults completed the online survey
- The majority of participants were female (70% [n = 433] of the ADHD group; 70% [n = 140] of the non-ADHD controls) (Table 2). The treated ADHD participants were
 - younger than the non-ADHD participants (mean 39.0 [SD = 12.4] years and mean 43.1 [SD = 17.0] years, respectively; $P < 0.001$)

TABLE 2

PARTICIPANT CHARACTERISTICS OF TREATED ADHD AND NON-ADHD (NORMATIVE) GROUPS

	ADHD (N = 616)	NON-ADHD (N = 200)
Age (years)**		
Mean (SD)	39.0 (12.4)	43.1 (17.0)
Range	18–74	18–84
Gender, n (%)		
Male	183 (29.7)	60 (30.0)
Female	433 (70.3)	140 (70.0)
Racial background, n (%)*		
White	551 (89.4)	168 (84.0)
Other	65 (10.6)	32 (16.0)
Relationship status, n (%)*		
Married	277 (45.0)	98 (49.0)
Separated	14 (2.3)	1 (0.5)
Divorced	64 (10.4)	22 (11.0)
Widowed	5 (0.8)	8 (4.0)
Living with partner	61 (9.9)	16 (8.0)
In a serious relationship	62 (10.1)	11 (5.5)
Single, not in a serious relationship	129 (20.9)	43 (21.5)
Other	4 (0.6)	1 (0.5)
Employment status, n (%)**		
Employed, full time	349 (56.7)	84 (42.0)
Employed, part time	66 (10.7)	19 (9.5)
Self-employed	37 (6.0)	12 (6.0)
Student	32 (5.2)	23 (11.5)
Stay-at-home parent/homemaker	33 (5.4)	17 (8.5)
Unemployed	24 (3.9)	35 (17.5)
Retired	27 (4.4)	7 (3.5)
Disabled	48 (7.8)	3 (1.5)
Currently attending school/taking classes, n (%)*		
Yes	129 (20.9)	22 (11.0)
No	487 (79.1)	178 (89.0)

Notes: * $P < 0.05$, ** $P < 0.001$ treated ADHD vs. non-ADHD group.

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; SD, standard deviation.

- more likely to be white (89% [n = 551] vs. 84% [n = 168]; $P < 0.05$)
- less likely to be married but more likely to be in a serious relationship ($P < 0.05$)
- more likely to be employed full time ($P < 0.001$), and
- less likely to be unemployed ($P < 0.001$)

Everyday Life Functional Impairments

- Participants with ADHD reported more impairment in their everyday life than those without ADHD. Significantly more impairments were reported in all the following categories (see Figure 1 for further details):

Impairments in Home Settings

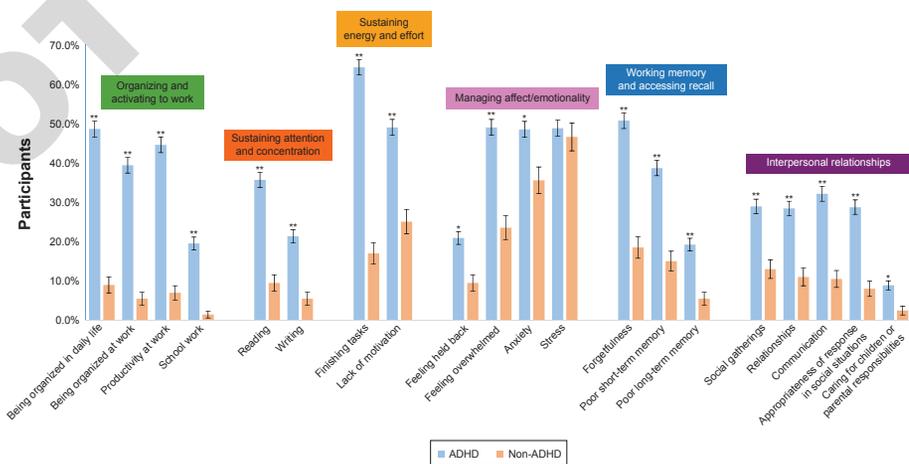
- ADHD significantly impacted the participants’ home life in several areas (Figure 2)

Impairments in Social Settings

- When the participants were asked if they experienced any of the following impacts on their social life, significantly more participants with treated ADHD than normative participants indicated that they:
 - Sustaining Attention and Concentration
 - had difficulty focusing when with friends or family (29% [n = 180] vs. 6% [n = 12]; $P < 0.0001$)
 - had difficulty holding conversations (32% [n = 195] vs. 10% [n = 20]; $P < 0.0001$)

FIGURE 1

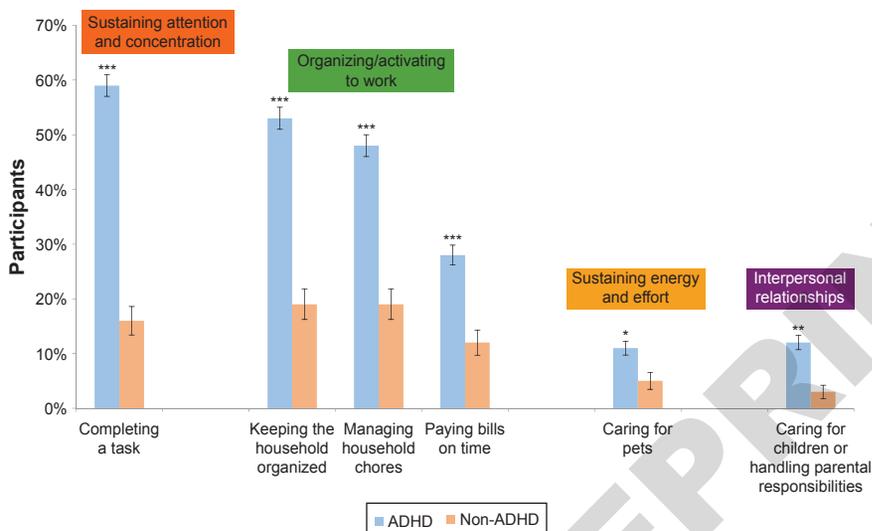
CHALLENGES IN EVERYDAY LIFE



Note: * $P < 0.05$, ** $P < 0.001$, *** $P < 0.0001$ vs non ADHD.

FIGURE 2

IMPAIRMENTS IN HOME SETTINGS



Note: * $P < 0.05$, ** $P < 0.001$, *** $P < 0.0001$ vs non ADHD.

- Organizing and Activating to Work
 - were late to social events (26% [n = 162] vs. 7% [n = 13]; $P < 0.001$)
- Sustaining Effort
 - could not sit through a movie (19% [n = 117] vs. 7% [n = 14]; $P \leq 0.0001$)
- Working Memory and Recall
 - tended to forget names (38% [n = 231] vs. 23% [n = 46]; $P = 0.0002$)
 - forgot to call friends (30% [n = 184] vs. 13% [n = 25]; $P < 0.0001$)
- Managing Affect/Emotionality
 - felt awkward (38% [n = 231] vs. 23% [n = 46]; $P = 0.0002$)
- Interpersonal Relationships
 - had difficulty making friends (21% [n = 130] vs. 15% [n = 29]; $P = 0.041$)
 - had difficulty maintaining friendships (22% [n = 135] vs. 11% [n = 22]; $P = 0.0007$)

Impairments in School/Work Settings

- Participants with ADHD reported significantly more difficulties at school/work than normative participants (Table 3)

Impaired Relationships

- Significantly more participants with treated ADHD than normative participants indicated that they experienced difficulties in various

TABLE 3

IMPAIRMENTS IN SCHOOL AND WORK SETTINGS REPORTED BY ADHD AND NON-ADHD PARTICIPANTS

DIFFICULTY, N (%) PARTICIPANTS	SCHOOL		WORK	
	ADHD (N = 129)	NON-ADHD (N = 22)	ADHD (N = 452)	NON-ADHD (N = 115)
Sustaining Attention and Concentration				
Focusing in class	65 (50.4)	7 (31.8)	NA	NA
Focusing while doing school work/tasks	59 (45.7)*	4 (18.2)	228 (50.4)***	12 (10.4)
Taking notes in class/meetings	40 (31.0)*	2 (9.1)	68 (15.0)**	6 (5.2)
Being engaged in meetings	NA	NA	95 (21.0)***	6 (5.2)
Organizing and Activating to Work				
Prioritizing tasks	41 (31.8)	4 (18.2)	NA	NA
Being organized	NA	NA	191 (42.3)***	13 (11.3)
Forgetting to do simple tasks	NA	NA	141 (31.2)***	9 (7.8)
Being productive	NA	NA	155 (34.3)***	13 (11.3)
Substaining effort				
Taking a long time to complete tasks	35 (27.1)	5 (22.7)	NA	NA
Taking tests within allocated time	33 (25.6)	5 (22.7)	NA	NA
Being on time to class/work	23 (17.8)	1 (4.5)	102 (22.6)**	9 (7.8)
Completing tasks on time	NA	NA	128 (28.3)***	6 (5.2)
Interpersonal Relationships				
Communicating with others	NA	NA	79 (17.5)	13 (11.3)
Getting along with coworkers	NA	NA	31 (6.9)	6 (5.2)
Getting along with the boss	NA	NA	35 (7.7)	8 (7.0)
Other				
Getting poor grades	15 (11.6)	1 (4.5)	NA	NA
Keeping a job	NA	NA	37 (8.2)	4 (3.5)

Notes: * $P < 0.05$, ** $P < 0.001$, *** $P < 0.0001$ vs. non-ADHD.

Abbreviation: NA, not asked.

aspects of their relationships, including aspects of affect/emotionality in relationships and interpersonal communication (Figure 2)

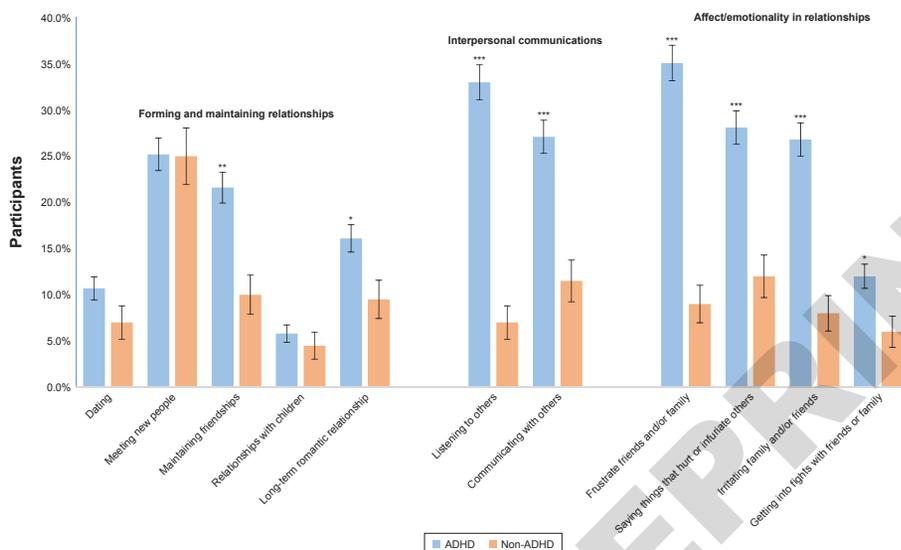
- A significantly higher percentage of participants with ADHD than normative participants acknowledged challenges in maintaining relationships with adults, but there appeared to be no significant difference between the two groups in new or short-term relationships, such as dating (Figure 3)

Difficult Days

- Significantly more participants with ADHD than normative participants indicated they had days that were more difficult than others (81% [$n = 499$] vs. 69% [$n = 138$]; $P < 0.001$). The top 3 reasons for the more difficult days, reported by significantly more participants with ADHD than normative participants, were having trouble focusing

FIGURE 3

IMPAIRED RELATIONSHIPS



Note: * $P < 0.05$, ** $P < 0.001$, *** $P < 0.0001$ vs non-ADHD.

(44% vs. 11%; $P < 0.0001$), having to meet deadlines (30% vs. 12%; $P < 0.0001$), and feeling rushed (40% vs. 24%; $P < 0.001$) (Table 4)

MOST CHALLENGING TIME OF THE DAY

- Although participants reported challenges across the day, the most challenging time of day for the greatest number of participants with ADHD was the afternoon (44%, $n = 269$), with this time problematic for fewer (29%, $n = 58$) normative participants ($P < 0.001$) (Figure 3)
- The evening was also a challenging time for 35% ($n = 218$) of participants with ADHD and 29% ($n = 58$) of normative participants

TABLE 4

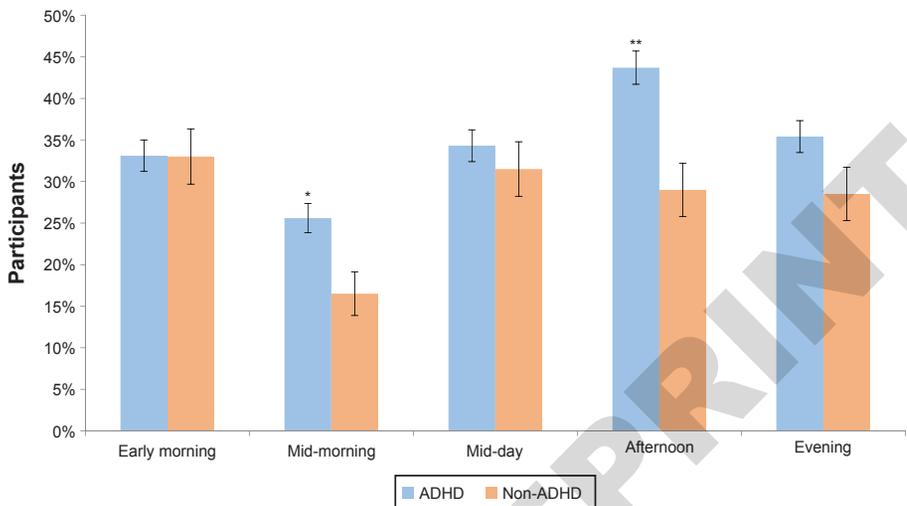
REASONS FOR DIFFICULT DAYS

N (%) PARTICIPANTS	ADHD (N = 499)	NON-ADHD (N = 138)
Trying to do too much	284 (56.9)**	57 (41.3)
Feeling bored	122 (24.4)*	21 (15.2)
Not getting everything done	305 (61.1)**	66 (47.8)
Feeling rushed	200 (40.1)***	33 (23.9)
Feeling overwhelmed	280 (56.1)**	59 (42.8)
Having to meet deadlines	151 (30.3) [†]	16 (11.6)
Having trouble focusing	222 (44.5) [†]	15 (10.9)

Note: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, [†] $P < 0.0001$ vs. non-ADHD.

FIGURE 4

MOST CHALLENGING TIME OF DAY



Note: * $P < 0.01$, ** $P < 0.001$ vs non-ADHD.

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- Midmorning was significantly more challenging for participants with ADHD than those without (26% [$n = 158$] vs. 17% [$n = 33$]; $P < 0.01$)
- For normative participants the early morning was most challenging for the greatest number (33%, $n = 66$); the same proportion of participants with ADHD also found the early morning the most challenging (33%, $n = 204$) (Figure 4)

IMPACT ON SLEEP

- There was no significant difference between treated ADHD and the non-ADHD sample with respect to the number of participants who had difficulty getting to sleep each night (9% [$n = 57$] vs. 6% [$n = 12$], $P > 0.05$)

STUDY LIMITATIONS

- The study had some limitations, potentially affecting the generalizability of the findings
 - The non-ADHD group was not matched with the ADHD group in every aspect; the non-ADHD group was older (mean age 43 vs. 39 years) and less likely to be employed full time (42% [$n = 84$] vs. 57% [$n = 349$]). In addition, both ADHD and non-ADHD groups included more women than men
 - Researchers were unable to objectively assess the percentage of respondents with ADHD receiving optimal medication management,

which could impact the degree of self-reported impairments and challenges

- There is a potential for selection bias, as participants were recruited through research participant panels
- Because the diagnosis and treatment of ADHD were self-reported and not physician confirmed, participants may have been interviewed who did not meet the study entry criteria

CONCLUSIONS

- Even with treatment, those with ADHD report substantial burdens from their ADHD symptoms. Despite receiving treatment, more adults with ADHD reported impairments and challenges in multiple aspects of their daily life than adults without ADHD. Further research is necessary to determine the extent of association between increased impairments/challenges for adults with ADHD and suboptimal management or treatment-agnostic ADHD disease burden
- Individuals with ADHD reported being affected by their ADHD impairments during multiple times of the day, with the greatest challenge for most being in the afternoon and evening hours. The challenges faced by adults with ADHD receiving medication occurred at home, school, or work and also impacted patients' social life and relationships
- Given these findings, clinicians prescribing medications for adults with ADHD should monitor treatment response throughout the entire day based on each patient's specific setting-based impairments. This can facilitate tailoring dose and timing to optimally manage ADHD impairments in adult patients ❀

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DISCLOSURE

Drs. Brown, Flood, Sarocco, Atkins, and Khachatryan have no conflict of interest to disclose in the preparation of this manuscript.

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