Supplementary Table 1: Consolidated criteria for reporting qualitative research (COREQ)

No. Item	Guide questions/description	Answer
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	n/a – responses collected via Qualtrics
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	KP: PhD, MSPH VG: PhD, neuropsychologist, licensed clinical psychologist JG: BA HD: PhD, RN MM: PhD, RN JK: MA DB: MD, board certified in sleep medicine (American Board of Psychiatry & Neurology, American Board of Sleep Medicine) LR: PhD, licensed clinical psychologist KS: PhD, licensed clinical psychologist
3. Occupation	What was their occupation at the time of the study?	KP: Postdoctoral Fellow; University of Pittsburgh (Research) VG: Postdoctoral Fellow; University of Virginia (Research) JG: Research Coordinator; University of Virginia HD: Professor; University of Pittsburgh (Research) MM: Assistant Professor, University of Virginia (Research) JK: Research Coordinator; University of Pittsburgh DB: Professor; University of Pittsburgh (Research, Clinical) LR: Professor; University of Virginia (Research) KS: Assistant Professor; University of Virginia (Research)
4. Gender	Was the researcher male or female?	The following researchers identify as female: KP, VG, HD, JG, MM, JK, KS The following researchers identify as male: DB, LR
5. Experience and training	What experience or training did the researcher have?	KP: caregiving, qualitative research methods VG: CBT-I, caregiving JG: qualitative research methods HD: caregiving, digital health, qualitative research methods

		MM: caregiving, digital health, qualitative research methods JK: caregiving, qualitative research methods DB: digital health, sleep medicine, CBT-I LR: digital health, CBT-I KS: CBT-I, caregiving, digital health, qualitative research methods
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	Caregivers were recruited through several different pathways. Most pathways, such as online advertisements, social media postings, and newsletter postings, were not targeting individuals with an existing relationship to the study team. However, caregivers were also recruited via the University of Pittsburgh Caregiver Research Registry, a longitudinal research cohort of self-identified caregivers in the Western Pennsylvania region, as well as the University of Pittsburgh Alzheimer's Disease Research Center caregiver database. These caregivers were familiar with these caregiving research groups at University of Pittsburgh.
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	During the informed consent process, participants were told that the study was being conducted to "better understand the unique sleep problems that occur when caregiving," as well as to "to understand how well SHUTi treats these sleep problems for caregivers." This information was also available on the study website, where interested individuals could learn about the study.
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	n/a – there was no interviewer / facilitator, as responses were entered online via open-ended text prompts
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Content analysis by way of rapid qualitative analysis and matrix analysis methodologies

Participant selection		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Convenience sampling using online US-national recruitment methods
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Caregivers were recruited through several different pathways. Caregivers could be informed about the trial by provider referral or seeing materials in-clinic (in-clinic recruitment); seeing advertisements or postings on social media; reading a posting in an email newsletter to which they had already enrolled; or by receiving an email or letter through the University of Pittsburgh Caregiver Research Registry, Alzheimer's Disease Research Center, or Pitt+Me research match program.
12. Sample size	How many participants were in the study?	100 caregivers participated in the study; 82 used the SHUTi program and were eligible to provide open-ended feedback analyzed in this analysis
13. Non-participation	How many people refused to participate or dropped out? Reasons?	Fourteen potentially eligible caregivers declined to participate prior to completing eligibility screening by phone; one caregiver was lost to follow-up during the baseline assessment period; one caregiver withdrew during the intervention period (due to work change). Eighteen participating caregivers did not use the SHUTi (see [69] for details).
Setting		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	Online surveys completed at caregivers' convenience.
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	It is unknown whether caregivers completed online surveys in the presence of others.
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	Participants were enrolled beginning January 2022 and all data collection was completed in March 2023. See Table 1 for demographic and caregiving characteristics of the sample.
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Survey prompts are available online at https://bit.ly/SHUTiCARE-project-project. These prompts had been previously used in a feasibility study of SHUTi among cancer caregivers [66].

18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	n/a
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	n/a
20. Field notes	Were field notes made during and/or after the interview or focus group?	n/a
21. Duration	What was the duration of the interviews or focus group?	n/a
22. Data saturation	Was data saturation discussed?	n/a
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	n/a
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	Each quote was separately coded by 2 of the following coders: KS, KP, JG, MM, HD. Discrepancies were resolved by the consensus of a third coder.
25. Description of the coding tree	Did authors provide a description of the coding tree?	n/a
26. Derivation of themes	Were themes identified in advance or derived from the data?	Pre-registered *a priori* codes were: whether the quote was caregiving-specific or not; whether the quote was specific to SHUTi (Internet-delivered CBT-I), CBT-I (in any delivery format), or digital health (of any therapy). Through the rapid qualitative analysis process, additional codes were derived through inductive analysis.
27. Software	What software, if applicable, was used to manage the data?	Quotations were exported from Qualtrics, then individually coded using a standardized, pilot-tested coding form in Qualtrics – see materials at https://bit.ly/SHUTiCARE-project
28. Participant checking	Did participants provide feedback on the findings?	Synthesized member checking was carried out with SHUTi Users – see materials at https://bit.ly/SHUTiCARE-project-project and details in [67].

Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Representative quotations are listed in-text and are identified with a participant identification number.
30. Data and findings consistent	Was there consistency between the data presented and the findings?	We aim to discuss data representatively in our Results and Discussion sections.
31. Clarity of major themes	Were major themes clearly presented in the findings?	We aim to discuss data comprehensively in our Results and Discussion sections.
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	We discuss discrepant findings in our Results and Discussion sections.

Supplemental Table 2: Open-ended prompts for SHUTi users

#	Prompt (and *condition*, where applicable)
1	*Endorsed SHUTi met most or all needs* → How did SHUTi meet your needs? *Endorsed SHUTi met few or no needs* → What could be different about SHUTi to meet more of your needs?
2	*Endorsed they would recommend SHUTi* → What are reasons you think it would be helpful to others? *Endorsed they would not recommend SHUTi* → What would have to be different about SHUTi to make you more likely to recommend it?
3	*Endorsed satisfaction with SHUTi* → What aspects of SHUTi did you like most? *Endorsed dissatisfaction with SHUTi* → What would need to be different about SHUTi for you to be satisfied?
4	*Endorsed would use SHUTi again* → Why would you be drawn to using SHUTi again? *Endorsed would not use SHUTi again* → What would need to be different about SHUTi for you to consider using it again?
5	How did your responsibilities as a caregiver affect your ability to complete SHUTi or follow the SHUTi program recommendations?
6	How did SHUTi help you as a caregiver?
7	SHUTi was initially developed among the general population. How did the educational content, recommendations, and delivery format fit for you as a caregiver?
8	Recalling that SHUTi was initially developed among the general population, what kinds of changes, if any, do you think we should consider to make sure caregivers can more easily use it?
9	How would tailoring intervention techniques, content, and delivery format to be more specific to caregivers change your experience with the SHUTi program?