L'Encéphale xxx (xxxx) xxx–xxx

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Original article

Validation of a data collection set for the psychiatric, addiction, sleep and chronobiological assessments of patients with depression: A Delphi study for the SoPsy-depression French national cohort

Validation d'un set de collecte de données pour les évaluations des troubles psychiatriques, addictifs, du sommeil et chronobiologiques des patients souffrant de dépression : étude Delphi pour la cohorte nationale française SoPsy-dépression

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https://doi.org/10.1016/j.encep.2022.07.004

Please cite this article as: Geoffroy PA, et al, Validation of a data collection set for the psychiatric, addiction, sleep and chrono-biological assessments of patients with depression: A Delphi study for the SoPsy-depression French national cohort, Encéphale, https://doi.org/10.1016/j.encep.2022.07.004

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ARTICLE INFO

Article history:
Received 2 May 2022
Accepted 15 July 2022
Available online xxx

Keywords:
Depression
Depressive disorders
Bipolar disorders
Sleep
Circadian rhythms
Biomarkers

ABSTRACT

Objectives. – Despite international efforts to identify biomarkers of depression, none has been transferred to clinical practice, neither for diagnosis, evolution, nor therapeutic response. This led us to build a French national cohort (through the clinical and research network named SoPsy within the French biological psychiatry society (AFPBN) and sleep society (SFRMS)), to better identify markers of sleep and biological rhythms and validate more homogeneous subgroups of patients, but also to specify the manifestations and pathogeneses of depressive disorders. Before inclusions, we sought to provide a predefined, standardized, and robust set of data to be collected in all centers.
Methods. – A Delphi process was performed to achieve consensus through the independent rating of invited experts, the SoPsy-depression co-investigators ($n = 34$). The initial set open for vote included 94 questionnaires targeting adult and child psychiatry, sleep and addiction.
Results. – Two questionnaire rounds were completed with 94% participation in the first round and 100% participation in the second round. The results of the Delphi survey incorporated the consensus opinion of the 32 members who completed both rounds. Nineteen of the 94 questionnaires achieved consensus at the first round and seventy of 75 at the second round. The five remaining questionnaires were submitted to three experts involved in the steering committee during a dedicated meeting. At the end, 24 questionnaires were retained in the mandatory and 26 in the optional questionnaire set.
Conclusions. – A validated data collection set of questionnaires is now available to assess psychiatry, addiction, sleep and chronobiology dimensions of depressive disorders.

Mots clés :
Dépression
Troubles dépressifs
Troubles bipolaires
Sommeil
Rythmes circadiens
Biomarqueurs

RÉSUMÉ

Objectifs. – Malgré de nombreux efforts internationaux portant sur l'identification de biomarqueurs de la dépression, aucun n'a pu être transféré en pratique clinique, ni pour l'aide au diagnostic, ni pour l'évolution, ni pour la réponse thérapeutique. Ceci nous a conduit à construire une cohorte nationale française (via le réseau français de clinique et de recherche nommé SoPsy au sein de la Société française de psychiatrie biologique et de neuropsychopharmacologie (AFPBN) et de la Société française de recherche et médecine du sommeil (SFRMS)), afin de mieux identifier au sein des troubles dépressifs les marqueurs du sommeil et des rythmes biologiques, de valider des sous-groupes plus homogènes de patients, et de préciser les manifestations et les différentes physiopathogénies. Avant les premières inclusions de cette cohorte, nous avons souhaité construire un set de données prédéfini, standardisé et robuste à collecter dans tous les centres investigateurs.
Méthodes. – Une méthode Delphi a été employée afin d'obtenir un consensus d'experts autour des questionnaires à utiliser par le biais de l'évaluation indépendante d'experts invités qui étaient les co-investigateurs de la cohorte SoPsy-Depression ($n = 34$, un seul investigateur par centre participant). Le lot initial de questionnaires proposés et ouverts au vote comprenait 94 questionnaires dans les domaines de la psychiatrie adulte et de l'enfant, les addictions, le sommeil et les rythmes biologiques.
Résultats. – Deux tours de vote ont été réalisés avec une participation de 94 % au premier tour et de 100 % au second tour. Les résultats de l'enquête Delphi ont intégré le consensus formalisé des 32 membres qui ont participé aux deux tours de vote. Dix-neuf des 94 questionnaires ont obtenu un consensus au premier tour et 70 sur 75 au second tour. Les 5 questionnaires restants ont été soumis au vote de trois experts impliqués dans le comité de pilotage lors d'une réunion dédiée. Au final, 24 questionnaires ont été retenus dans le set obligatoire de questionnaires obligatoires et 26 dans le set optionnel de questionnaires.

Conclusions. – Ce travail a permis d'obtenir un set de questionnaires validés pour la collecte multicentrique de données multidimensionnelles évaluant des patients souffrant de troubles dépressifs.

Introduction

Depressive symptoms are frequent and very heterogeneous psychiatric disorders affecting up to 20% of the general population [1–3]. Depression is a major public health problem and a leading cause of time spent with disability [4], and thus associated with considerable economic burden [5]. Until today, diagnostic processes of depression rely exclusively on clinical evaluation, commonly using validated criteria from international classifications of psychiatric disorders such as the DSM-5 (American Psychiatric Association) or the CIM-11 (World Health Organization) [6,7]. Despite international efforts on identifying biomarkers associated with major depressive disorder (MDD) or bipolar disorder (BD) for instance, no reliable biomarkers have been transferred into clinical practice, neither for diagnosis, evolution, or therapeutic response [3]. Some of the discrepancies and non-replicated findings from previous works are the direct consequence of the nature of MDD and BD that encompasses very heterogeneous entities [3,8]. Existing diagnostic categories are based on clinical consensus and fail to align with findings emerging from clinical neuroscience and genetics [9]. Of note, the boundaries of these categories have not been predictive of treatment response and have not helped to capture fundamental underlying mechanisms of depression that could pave the way for new drug development [3,9].

Within this context of unsatisfactory broad categories, several authors proposed a return to fundamental dimensional pillars, approaching the core features and natural presentations of mood disorders closer to biological processes [10,11]. The "sleep" dimension is one of these dimensional pillars to consider in mood disorders, as it is a core symptom of depressive syndromes occupying a primary position in the pathophysiology, phenomenology, historical accounts, and time course of episodes in mood disorders [10,12–16]. Moreover, sleep complaints are reported by more than 90% of patients suffering from depression [17,18], and bidirectional links have been observed between mood episodes and these sleep disturbances [12,19]. Sleep disturbances and daytime sleepiness worsen the severity of depressive symptoms [20], are associated with poorer treatment response [21], and increased risk of suicide [22–24]. Sleep disturbances often persist after acute depressive episodes and are the main residual symptom, affecting more than half of patients with BD for instance [25], increasing the risk of relapses and recurrences [22]. Regarding objective markers, studies using actigraphy reported alterations of sleep-wake cycles during depressive episodes with less activity during daytime and longer periods of wake after sleep onset [26]. Studies using polysomnography (PSG) reported that patients may present several alterations including a shortened time spent in slow wave sleep (SWS), increased rapid eye movement (REM) sleep duration, shortened REM sleep latency, a prolongation of the first REM period, and increased REM density [27–34]. Taken as a whole these PSG findings indicate that a combination of diminished SWS duration and increased REM density may be possible biological markers for MDD but this literature has many conflicting results and un-replicated findings [35,36]. Interestingly, recent works suggest that patients with seasonal affective disorders (SAD), which is a depression subtype directly linked to the shortened photoperiod during winter, may have more specific sleep biomarkers [37]. Although these results were observed in very heterogeneous populations of patients suffering from depressive syndromes, these first findings using "sleep" biomarkers are encouraging, with some subgroups being more specifically associated with different circadian and sleep disturbances. Indeed, several dysfunctions of circadian, homeostatic and photic regulation of sleep and waking have been reported [12–15,38,39]. Better characterizing this "sleep" domain and identifying more homogenous subgroups may allow to both better treat acute episodes but also to prevent the manifestation or recurrences of mood disorders with existing chronotherapeutics, as well as developing new drugs.

In 2016, we decided to create a French clinical and scientific network named SoPsy ('*Sommeil Psychiatrie*' for 'Sleep and Psychiatry' in French) within the French biological psychiatry society (AFPBN) and the French sleep society (SFRMS). In addition to the organization of pedagogic sessions and meetings, scientific collaborations, and the publication of clinical recommendations [40–44], the SoPsy group decided in 2019 to create a national cohort of patients suffering from a major depressive episode to assess markers of sleep and circadian rhythms associated with different subtypes of depression. The main objective is to build a standardized and robust national dataset to be able to validate biomarkers and biosignatures. The high quality of prospective data will allow us to identify more homogeneous subgroups of patients, but also to specify the manifestations and pathogeneses of depressive disorders and to pinpoint, through the implementation of specific protocols, predictive markers of evolution, therapeutic responses and depressive recurrences.

Since many centers and experts were contributing to the SoPsy group, and before the first inclusion, we decided a priori that the data set to be collected should first be corroborated through a consensus within the network. We thus aimed to assess the agreement on the data collection set proposed by the SoPsy network by the conventional Delphi method [45].

Methods

According to the guidelines of the French national institute of health (HAS, Haute Autorité de Santé) regarding methods for developing good practice recommendations [46], we used the recommended conventional Delphi survey technique to reach a consensus [47], based on the collection of anonymous experts' opinions and regular feedback to reach a consensus on the value matrix. This iterative process continues until there is a convergence of opinion or until no further substantial changes are elicited in the replies. The experts selected for this Delphi were expected to be the users of the data collection set; therefore, all experts were co-investigators of the SoPsy-Depression cohort study. These experts are trained senior physicians working in adult or child psychiatry and/or addiction departments, and/or sleep centers. They are all members of the SoPsy network, and thus have interest in sleep and/or chronobiology in psychiatry. In case of several investigators of the SoPsy network from the same department, only one expert by department was allowed to report a vote for the department. Invitations to participate were sent by email providing a personal link to the online survey. Individual responses from panel members were confidential and independent. All panel members' details and responses were anonymized and hidden to others. Three groups of experts were defined as sleep, adult psychiatry and child psychiatry experts. A preliminary step was to collect an extensive set of

Table 1
Rules to reach consensus for both mandatory set and the optional set.

	First round	Mandatory set		
	Positive consensus ≥ 80%[a] (rating 7–8–9)	Negative consensus ≥ 80%[a] (rating 1–2–3)	No consensus	
Optional set	Positive consensus ≥ 80%[a] (rating 7–8–9)	Selected questionnaire in mandatory set	Selected questionnaire in optional set	Submitted to second round to be rated for both mandatory and optional set
	Negative consensus ≥ 80%[a] (rating 1–2–3)	Selected questionnaire in mandatory set	Eliminated questionnaire	Submitted to second round to be rated for mandatory set
	No consensus	Selected questionnaire in mandatory set	Submitted to second round to be rated for optional set	Submitted to second round to be rated for both mandatory and optional set
	Second round	**Mandatory set**		
	Positive consensus ≥ 60%[b] (rating 7–8–9)	Negative consensus ≥ 60%[b] (rating 1–2–3)	No consensus	
Optional set	Positive consensus ≥ 60%[b] (rating 7–8–9)	Selected questionnaire in mandatory set	Selected questionnaire in optional set	Selected questionnaire in optional set
	Negative consensus ≥ 60%[b] (rating 1–2–3)	Selected questionnaire in mandatory set	Eliminated questionnaire	Eliminated questionnaire
	No consensus	Selected questionnaire in mandatory set	Eliminated questionnaire	Submitted to third round to be rated for both mandatory and optional set

[a] Threshold corrected to 77% for adult psychiatric questionnaire and to 66% for pediatric psychiatric questionnaire.
[b] Threshold corrected to 58% for adult psychiatric questionnaire and to 66% for pediatric psychiatric questionnaire.

possible questionnaires used in centers to propose for the Delphi consensus. All solicited experts were asked to provide questionnaires that they used in their clinical practice. The proposed set of questionnaires consisted of 94 questionnaires including 30 questionnaires for adult psychiatry, 23 for child psychiatry and sleep, 26 for adult sleep assessment, and 15 for adult addiction (list of questionnaires available in Table S1).

Instructions to complete the survey and about how consensus would be achieved were provided for all experts on the introduction page of the Delphi survey (introduction page available in Fig. S1).

For the first round, the survey was sent to the 34 expert panel members of 34 psychiatric or sleep disorders centers, who independently rated agreement for each questionnaire using a nine-point scale. There was an option for free comments at the end of each questionnaire, to offer clarification or further information. The scoring was requested for all questionnaires whatever its use or not in daily clinical practice. Commensurate with the objectives of the Delphi study [45,47], for each questionnaire the consensus was reached when 80% of the experts rated a score of 7, 8 or 9 (defining a positive consensus) or 1, 2 or 3 (defining a negative consensus). The questionnaire thread was randomly scheduled.

The large panel of proposed questionnaires and the specialization of some of these questionnaires led us to propose three rules to adjust the definition of the consensus:

- we formulated a consensus proposal for two data collection sets, i.e. a mandatory data collection set and an optional data collection set. The threshold of consensus was the same whatever the panelist rated for the mandatory or the optional data collection set. A positive consensus reached first for the mandatory set was prioritized over a consensus (positive or negative) for the optional set. In addition, if no positive consensus was reached for the mandatory data collection set but a positive consensus was reached for the optional data collection set, the questionnaire was retained in the optional data collection set;
- considering the specialization of some questionnaires, the threshold of 80% regarding the obtained consensus rate was corrected to allow satisfactory completion of the survey. The correction considered the number of experts by field: 31 for adult questionnaires leading to a corrected threshold of 77%, and 3 for child questionnaires leading to a corrected threshold of 66%;
- lastly, regarding the set of adult questionnaires, a discrimination was performed by specific field of medical practice between psychiatry, sleep, and addiction.

In the expected absence of a consensus for all questionnaires at the first round, a second round was programmed and corrected at the end of the first round. Only expert participants who completed round 1 where further invited to complete round 2. Only questionnaires with an absence of consensus (i.e. without positive or negative consensus) were considered. Reponses and rates from round 1 were visible at round 2 to participants, with the previous reply of the participant at round 1 and the median rating from the entire panel of experts. Experts had the opportunity to change their scores (for the mandatory and optional sets) in order to reach a consensus. The consensus definition was adjusted by reducing the rating scale to 5 valences (from 1: "no, not at all" from to 5: "yes, absolutely") and in case of low consensus rate since the first round, the agreement threshold would be decreased to 60%. Because the goal of this Delphi was to reach consensus on a predefined set of data collection questionnaires, a low threshold of agreement was acceptable. The a priori number of rounds to terminate this Delphi process was 2. However, a round 3 was planned to reach a consensus for possible few remaining questionnaires, with 3 experts (PAG who is an adult psychiatrist, CMS who is a child and adolescent psychiatrist and MPdO who is a sleep physician) involved in the steering committee who independently score with the same process as in round 2 and could re-classify some questionnaires to keep a coherent and balanced collection set of subjective markers.

Study data were collected by an electronic questionnaire (Delphi software) developed by the clinical research department of Hôpital Bichat, Paris (CC and BB), in collaboration with the principal investigator (PAG). Data generated by electronic survey was exported to the R software for analysis.

Table 2
List of selected questionnaires for the mandatory set after consensus.

List	Name	Administration mode	Domain
Mandatory data set (n = 24)			
2	Columbia-Suicide Severity Rating Scale (C-SSRS) "lifetime"	Hetero-questionnaire	Psychiatry
10	Mood disorder Questionnaire (MDQ)	Self-questionnaire	Psychiatry
11	Quick Inventory of Depressive Symptomatology (Self-Report) (QIDS-SR16)	Self-questionnaire	Psychiatry
14	Hospital Anxiety and Depression scale (HAD)	Self-questionnaire	Psychiatry
20	State Trait Inventory Anxiety (STAI B) – Trait	Self-questionnaire	Psychiatry
22	Generalized Anxiety Disorder – 7 items (GAD-7)	Self-questionnaire	Psychiatry
24	Adult Self-Report Scale (ASRS) Short version	Self-questionnaire	Psychiatry
31	Fagerstrom HSI	Self-questionnaire	Addiction
33	Alcohol Use Disorders Identification Test (AUDIT), short version	Self-questionnaire	Addiction
34	Cannabis Use Disorders Identification Test-Revised (CUDIT-R)	Self-questionnaire	Addiction
37	The Alcohol, Smoking and Substance Involvement Screening Tool – Lite (ASSIST-Lite)	Self-questionnaire	Addiction
48	Sleep Habits Questionnaire	Self-questionnaire	Sleep
49	Insomnia Severity Index (ISI)	Self-questionnaire	Sleep
50	Pittsburg Sleep Quality Index (PSQI)	Self-questionnaire	Sleep
53	Munich ChronoType Questionnaire (MCTQ)	Self-questionnaire	Sleep
55	Epworth Sleepiness Scale (ESS)	Self-questionnaire	Sleep
58	Hypersomnia Severity Index (HSI)	Self-questionnaire	Sleep
61	Berlin questionnaire sleep apnea	Self-questionnaire	Sleep
70	'When you try to relax in the evening or sleep at night, do you ever have unpleasant, restless feelings in your legs that can be relieved by walking or movement?' (Ferri et al., Eur J Neurol, 2007)	Self-questionnaire	Sleep
72	Pediatric sleepiness scale	Hetero-questionnaire	Specific for children – sleep
76	Children – sleep habits questionnaire (CSHQ)	Hetero-questionnaire	Specific for children – sleep
77	Munich ChronoType Questionnaire (MCTQ)	Self-questionnaire	Specific for children – sleep
81	Children Depression Inventory (CDI)	Hetero-questionnaire	Specific for children – psychiatry
82	ADHD Rating scale (parents' version)	Hetero-questionnaire	Specific for children – psychiatry

The percentage of respondents scoring an item 1, 2 and 3 and 7, 8 and 9 were respectively calculated for each questionnaire for the mandatory set and the optional set. A summary of the selection process is proposed in Table 1.

Results

The Delphi panel was composed of 34 trained physicians who all agreed to participate in the consensus study. The first and second Delphi rounds were sent by email to the panel members in November–December 2020 and March–April 2021, respectively.

The first round was completed by 94% (32 of 34) experts, after six automatic email reminders via the Delphi software and after individualized email reminders from the principal investigator. Nineteen of 94 questionnaires achieved consensus at the first round, with 6 retained for the mandatory data set (2 in addiction group and 4 in child group); 12 retained for the optional data set (7 in adult group, 2 in addiction group and 3 in child group); and 1 eliminated with a negative consensus (in child group); see detailed results in Table S1.

The second round thus concerned 75 questionnaires. The participation rate for this second round reached 100% (32 out of 32) with all experts who completed the first round. Seventy of 75 questionnaires (93,3%) achieved consensus at the second round, 13 for the mandatory data set (10 in adult group, 2 in addiction group and 1 in child group); 8 for the optional data set (5 in adult group and 3 in addiction group); and 49 were eliminated with a negative consensus (29 in adult group, 5 in addiction group and 15 in child group); see detailed results in Table S1.

The third round concerned 5 questionnaires, of which 1 was retained in the mandatory set, 3 in the optional set, and 1 was eliminated from the collection.

The results of questionnaires retained by the Delphi survey and validated by the consensus opinion of the 32 experts from different centers and then by the steering committee are reported in the Tables 2 and 3 with a mandatory set of 24 questionnaires and an optional set of 26 questionnaires.

Discussion

Applying the conventional Delphi method to achieve consensus among a panel of pediatric and adult psychiatric and sleep experts all involved in the SoPsy network, we built a standardized and robust data collection set. After two rounds with 34 experts and a third round validated by the steering committee, 24 questionnaires were retained in the mandatory set and 26 in the optional set. The Delphi method was conducted over a short period of time without major novelties in subjective assessments. Whereas each questionnaire was a priori independent, all questionnaires composed a coherent data collection set which will be included in the global evaluation of patients with depression across the lifespan. The third round of the Delphi, with an overall verification of the steering committee, guaranteed high quality of the overall set and its application in current clinical practice, as well as enabling a good dynamic of inclusions with an easy and fast assessment in daily practice.

Using an opinion panel tool, we designed a multi-expertise, multi-criteria data collection set in the field of depression for a multi-scale assessment. The Delphi method allowed to define a list of questionnaires both to well consider the global spectrum of clinical manifestations of depressive disorders and to improve the adherence of all centers to the cohort. The mandatory set interestingly included 7 questionnaires characterizing different psychiatric dimensions (suicide, depressive, manic, anxiety, ADHD) with no re-classification of questionnaires by the steering committee. Four questionnaires characterizing addiction were identified (alcohol, cannabis, tobacco, and other substances), and the steering committee decided to retain additionally the short version of the AUDIT

Table 3
List of selected questionnaires for the optional set after consensus.

List	Name	Administration mode	Domain
Optional data set ($n = 26$)			
1	Montgomery-Asberg Depression Rating Scale (MADRS)	Hetero-questionnaire	Psychiatry
3	Columbia-Suicide Severity Rating Scale (C-SSRS) "last week"	Hetero-questionnaire	Psychiatry
4	Young Mania Rating Scale (YMRS)	Hetero-questionnaire	Psychiatry
5	Mini International Neuropsychiatric Interview (MINI)	Hetero-questionnaire	Psychiatry
12	Beck depression Inventory (BDI-2)	Self-questionnaire	Psychiatry
18	Multidimensional Assessment of Thymic States (Mathys)	Self-questionnaire	Psychiatry
19	State Trait Inventory Anxiety (STAI A) – State	Self-questionnaire	Psychiatry
28	Post-traumatic stress disorder Checklist version DSM-5 (PCL-5)	Self-questionnaire	Psychiatry
29	Traumatic Life Events Questionnaire	Self-questionnaire	Psychiatry
32	Alcohol Use Disorders Identification Test (AUDIT) Full version	Self-questionnaire	Addiction
35	Stimulants – simple question	Self-questionnaire	Addiction
36	Opioids – simple question	Self-questionnaire	Addiction
38	Benzodiazepine Cognitive Attachment Scale (Echelle cognitive d'attachement aux benzodiazépines, ECAB)	Self-questionnaire	Addiction
39	Canadian Problem Gambling Index (ICJE)	Self-questionnaire	Addiction
40	Internet Addiction Test de Young (IAT)	Self-questionnaire	Addiction
52	Horne et Osberg Morningness-Eveningness Questionnaire (MEQ)	Self-questionnaire	Sleep
59	Idiopathic hypersomnia severity scale (IHSS)	Self-questionnaire	Sleep
60	Seasonal Pattern Assessment Questionnaire (SPAQ)	Self-questionnaire	Sleep
64	Mannheim Dream Questionnaire (MADRE)	Self-questionnaire	Sleep
68	Fatigue Severity Scale (FSS)	Self-questionnaire	Sleep
71	International Restless Legs Syndrome Scale (IRLS)	Self-questionnaire	Sleep
75	Gozal questionnaire	Hetero-questionnaire	Specific for children – sleep
78	Morningness-Eveningness Questionnaire for children	Hetero-questionnaire	Specific for children – sleep
79	IRLSSG criteria for children	Hetero-questionnaire	Specific for children – sleep
83	Behavior rating inventory of executive function (BRIEF)	Hetero-questionnaire	Specific for children – psychiatry
88	SRS – Children/adolescents version	Hetero-questionnaire	Specific for children – psychiatry

for the mandatory and the full version for the optional set. Furthermore, 8 questionnaires for "sleep" dimension (habits, insomnia, sleep quality, chronotype, sleepiness, hypersomnia, apnea and restless leg syndrome screenings) were initially included, and the steering committee decided to add a questionnaire for chronotype since none was retained despite being an essential marker, and the only chronobiological marker in the mandatory set; the committee further decided to move a necessary screening questionnaire for apnea, hypersomnia and sleepiness from the optional set to the mandatory one because of their high prevalence in patients with depressive disorder [17,48–50]. Finally, 5 questionnaires were included initially examining these dimensions specifically in children and adolescents (habits, sleepiness, chronotype, depressive and ADHD symptoms) with here again the Munich ChronoType Questionnaire (MCTQ) retained in the mandatory set to assess chronotype and social jet-lag syndromes which are especially prevalent in adolescents [51].

The validation of such a set of questionnaires is a first major step to standardize the collection of clinical data in numerous expert centers from a network and identify new markers and sub-types of depressive disorders. This will lead to a better understanding of both manifestations, clinical courses, etiopathogeneses and responses to treatments. Such clinical collection of data offers other perspectives of interest and may combine with more biological or objective data. For instance, data from molecular and clinical neuroscience may yield biosignatures that will improve clinical symptoms management and guide clinical care [9]. Indeed, actigraphy and overnight EEG yielded first interesting results [37,52] and should be associated with these subjective markers. In addition, new approaches using digital solutions with passive and active data collection (digital phenotyping) may also be combined with these biosignatures and clinical manifestations [53]. This timely SoPsy-depression cohort aims to merge all these approaches in order to progressively implement personalized medicine in psychiatry and increase the probability of remission and antidepressant treatment success, using an innovative multimodal approach that will allow the identification of novel composite signatures and new combinations of biomarkers.

Authors contributions

PAG is the principal investigator of the SoPsy-depression project. CC conceived the design of the Delphi study and made statistical analyses; PAG, CMS and CC conceived the questionnaires; PAG, CMS, MPO and CC analyzed the results; Basma Basil (BB) programmed the on-line survey; PAG and CC wrote the first version manuscript; all authors approved the final version of the manuscript.

Disclosure of interest

The authors declare that they have no competing interest.

Sponsors

The study received financial support of the Société Française de Recherche et Médecine du Sommeil (SFRMS) and of the Fondation Avenir.

Acknowledgements

We thank Basma Basli for her assistance in the Delphi process, Sonia Maklhouf who helped to validate the French legal authority, and Alix Romier who helped checking questionnaires.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.encep.2022.07.004.

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