



## Scoping review about well-being in the ‘brain migration’ studies

Alejandro Vega-Muñoz<sup>a,b</sup>, Paloma González-Gómez-del-Miño<sup>c</sup>,  
Guido Salazar-Sepúlveda<sup>d,e,\*</sup>

<sup>a</sup> Doctoral School, Universidad Complutense de Madrid, 28223 Madrid, Spain

<sup>b</sup> Facultad de Ciencias Empresariales, Universidad Arturo Prat, 1110939 Iquique, Chile

<sup>c</sup> Facultad de Ciencias Políticas y Sociología, Universidad Complutense de Madrid, 28223 Madrid, Spain

<sup>d</sup> Facultad de Ingeniería, Universidad Católica de la Santísima Concepción, 4090541 Concepción, Chile

<sup>e</sup> Facultad de Ingeniería y Negocios, Universidad de Las Américas, 4090940 Concepción, Chile



### REVIEW HIGHLIGHTS

- To cover drain, gain and brain circulation, calling it brain migration, contributing to comprehensive studies on this migratory phenomenon.
- Focus on the relationship between advanced human capital and well-being considering behavioral aspects beyond migration motivations.
- To identify as factors of subjective well-being in brain migrants, rootedness and ethical and moral dilemmas for those left behind in the origin.
- To relate the return decision of brain migrants to contextual factors that influence their objective individual well-being in the host country.
- Establishes the predictive role of well-being in brain migration processes, based on the personality and positive predisposition of migrants.

### ARTICLE INFO

#### Method name:

How to review the scope of brain migration studies.

#### Keywords:

Well-being  
Human mobility  
High skill migrant  
Quality of life  
Social capital  
Socioeconomic status  
Social relationships

### ABSTRACT

Research on advanced human capital migration has focused on the constructs: brain drain, brain gain and brain circulation (grouped as brain migration). The behavior of brain drainers and their migration flow is affected by perceived well-being. Our study comprehensively reviews research on the well-being of highly skilled migrants in search of the constructs and classes with which well-being in brain migration is studied. Research published in the WoSCC and Scopus databases was reviewed. Subsequently, a scoping review of the literature with the PRISMA – ScR guidelines, reporting information sources and search strategy, eligibility criteria (PICOS tool), mode of study selection and data extraction, and ways to assess quality, control bias, and synthesize results. Finally, nine papers were selected, with three types of populations analyzed and two epistemic-methodological approaches: 1) the effects of roots at origin, the ethical and moral dilemmas of the brain drain and the possibilities of return on the well-being of highly qualified emigrants, and 2) identification of the business, economic and political aspects of the destination country that condition individual well-being, adaptation and permanence. Future lines of research will focus on both categories and evaluate their effects on brain migration, and on the origin and destination countries.

\* Corresponding author.

E-mail addresses: [alvega03@ucm.es](mailto:alvega03@ucm.es), [alejavega@unap.cl](mailto:alejavega@unap.cl) (A. Vega-Muñoz), [pagonzal@ucm.es](mailto:pagonzal@ucm.es) (P. González-Gómez-del-Miño), [guido.salazar@edu.udla.cl](mailto:guido.salazar@edu.udla.cl), [gsalazar@ucsc.cl](mailto:gsalazar@ucsc.cl) (G. Salazar-Sepúlveda).

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Specifications table

Subject area:	Psychology
More specific subject area:	Behavior and well-being of migrants with advanced human capital.
Name of your protocol:	How to review the scope of brain migration studies.
Keywords:	Well-being, human mobility, high skill migrant, quality of life, social capital, socioeconomic status, social relationships
Resource availability:	Review protocol: <a href="https://doi.org/10.5281/zenodo.14020275">https://doi.org/10.5281/zenodo.14020275</a> . Dataset: <a href="https://doi.org/10.5281/zenodo.14029171">https://doi.org/10.5281/zenodo.14029171</a> . (Extracted from: Web of Science - Core Collection - databases (SCIE, SSCI, ESCI, BKCI-SSH, CPCI-SSH, CPCI-S, A&HCI), and Scopus database)
Review question:	How is the behavior of brain drainers affected by perceived well-being? How are brain drain migration flows affected by perceived well-being?

Background

Well-being is a complex construct, with breadth and multidimensionality capable of incorporating subjective and objective influences on people’s life course [1–3]. Objective well-being is defined as material well-being and quality of life, dependent on the development and successful exercise of human capabilities [4–6]. While subjective well-being, is a general internal state of mental well-being, including or not the realization of pleasure and avoidance of pain, dependent on our favor and disfavor attitudes, and is divided into two complementary approaches: Hedonic well-being, or based on desire, pleasure, and enjoyment. [1,7–11], and Eudaimonic well-being focused on self-realization, meaning and purpose [1,12–15].

International migration generates an impact on objective and subjective well-being in people who make this kind of decision [16]. In the objective well-being case we usually observe increased family income, caused by the transition economy [17]; another effect is the promotion of social capital in those households that receive money remittances from their migrant relatives [18], and also by migrants who return to their country of origin with capital (accumulated savings) to experience a comfortable old age [19].

Contrarily, subjective well-being benefits from greater social support and the characteristics of migrants in the face of surrounding changes [20]. Cases have been studied in which immigrant physicians who, faced with a lack of equal professional opportunities, have lower subjective well-being [21]. This is why, the decision to emigrate by people with a high educational level is associated with both quality-of-life satisfaction and consumption levels, and not only with the effects caused by the poor economic conditions of the origin country [22,23]. There is a positive correlation between subjective well-being and health, improved social skills and productivity [24].

It is important to continue advancing research on international migration flows and the positive effect on the happiness of migrants, but unfortunately, they do not usually reach the same levels as natives [25]. Thus, our study aims to review the scope of well-being research in studies of highly skilled migrants (brain migrants), distinguishing the constructs with which well-being is studied in cases of brain drain, brain gain, and brain circulation (brain migration) [26], and the classification categories for studies of well-being in brain migration. This will lay the groundwork for more comprehensive research on the topic of brain migration and generate input for policy and decision makers.

Method details

This work about well-being in brain migration studies uses the scoping review, a specific typology within review studies [27], the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [28,29], in particular PRISMA Extension for Scoping Reviews (PRISMA-ScR) [30], and the PICOS (Participants, Interventions, Comparators, Outcomes and Study Design) strategy to establish eligibility criteria for articles [31], whose protocol has been registered in Zenodo (Vega et al. 2024), under the modified PROSPERO format recommended by Tricco et al. [30].

According to the current checklist of the PRISMA-ScR guidelines [30], the following quality steps for systematic reviews were verified according to these items: (1) title, (2) structured summary, (3) rationale, (4) objectives, (5) protocol and registration, (6) eligibility criteria, (7) information sources, (8) search, (9) selection of sources of evidence, (10) data charting process, (11) data items, (12) critical appraisal of individual sources of evidence, (13) synthesis of results, (14) selection of sources of evidence, (15) characteristics of sources of evidence, (16) critical appraisal within sources of evidence, (17) results of individual sources of evidence, (18) Synthesis of results, (19) summary of evidence, (20) limitations, (21) conclusions, and (22) funding. The initial search for articles was performed using bibliometric procedures [32].

Information sources and search strategy

We used a set of articles from two databases, with equivalent search vectors and without additional restrictions (such as period of years or types of documents), reporting double indexing and trying to report citations and categories from a single database, given the lack of homogeneity in the citation counting and cataloging bases of their indexed journals. Ensuring the possibility of comparing articles and journals in relation to impact factors and quartiles [33–35], relying on the Web of Science - Core Collection (WoSCC) and Scopus, selecting articles published in journals indexed in these databases, from a search vector on Brain Migration (Brain Drain, Brain Gain and Brain Circulation) and Well-being in WoSCC: {TS=((brain NEAR/0 drain) OR (brain NEAR/0 gain) OR (brain NEAR/0 circulation)) AND (well-being OR well-being))}, and Scopus: {TITLE-ABS-KEY (((brain W/0 drain) OR (brain W/0 gain) OR (brain W/0 circulation)) AND ((well-being) OR (wellbeing)))}. We used the thematic search tag TS (searching simultaneously on title, abstract,

**Table 1**  
Eligibility criteria using.

PICOS	Description	Inclusion reason
Population	Physicians (including health professionals such as nurses), Researchers (including those studying to be researchers and researchers in training).	Brain migration definition
Interventions	Application of questionnaires, interviews, focus groups, or participation in reflective processes about their work.	Open to formal and empirical sciences
Comparator	1) Focus on well-being of brain migrants, and 2) Research method, Migrant population analyzed, Sample (n).	Focus on the topic under study
Outcomes	1) Theoretical constructs and items of construct on well-being of brain migrants. 2) Category of studies.	Focus on the topic under study
Study designs	No a priori restrictions. Theoretical, quantitative, qualitative, and mixed-study types were included (under quality criteria).	Open to formal and empirical sciences

author keywords, and Keywords Plus®), the Boolean operators AND (excluding) and OR (including), and the word proximity operator (NEAR/x) that simultaneously incorporates contiguous words that make up the concept of ocean literacy, providing coverage for the PRESS 2015 guideline statement [36].

### Eligibility criteria

The selection of articles was based on the following eligibility criteria: target population (participants), interventions (methodological techniques), elements of comparison of these studies, outcomes of these studies, and study designs (the criteria of the PICOS strategy as shown in Table 1).

### Study selection and data extraction

As a first step, according to the search strategy, a first extraction of documents from WoSCC databases was carried out on October 11, 2023, followed by the extraction from Scopus and an update of documents from WoSCC on February 23, 2024.

Then, duplicates were manually removed. Then, the titles and abstracts of articles were checked for relevance by two researchers. Subsequently, they independently reviewed the full texts of potentially eligible articles. Any disagreements were discussed with a third researcher, until a consensus was reached.

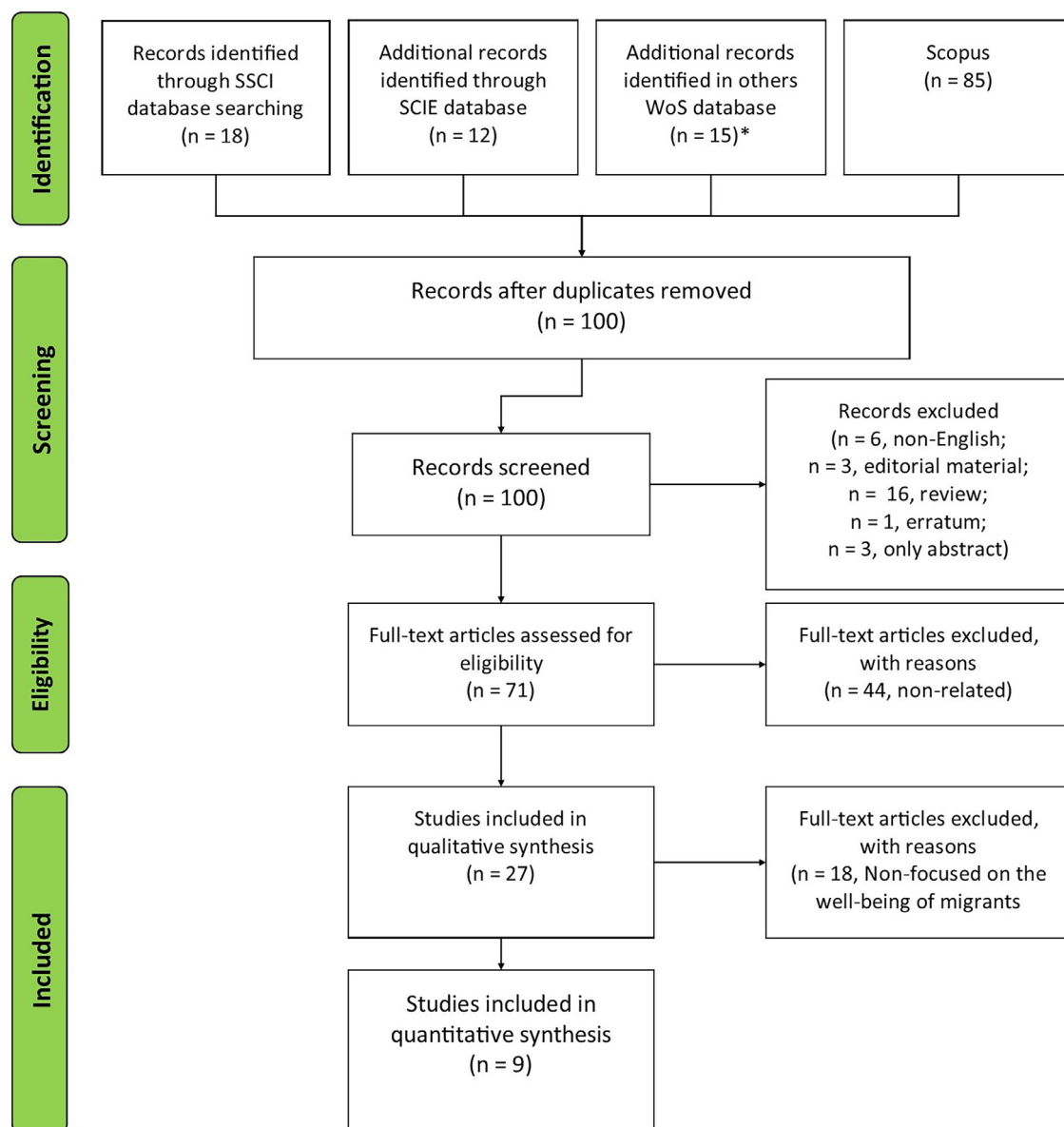
According to the eligibility criteria declared in Table 1, we then excluded letters, editorial materials, reviews, and documents containing only abstracts. Articles that were not related to the concepts of brain migration and well-being were excluded (this process was repeated in the full document detail review). In addition, articles not written in English were excluded (other full-length documents written in German, French and Hungarian).

The data items in phase one correspond to 64 fields per record in WoSCC and 46 fields per record in Scopus, as detailed below. WoSCC: 1) Authors, 2) Book Authors, 3) Book Editors, 4) Book Group Authors, 5) Author Full Names, 6) Book Author Full Names, 7) Group Authors, 8) Article Title, 9) Source Title, 10) Book Series Title, 11) Language, 12) Document Type, 13) Conference Title, 14) Conference Date, 15) Conference Location, 16) Conference Sponsor, 17) Conference Host, 18) Author Keywords, 19) Keywords Plus, 20) Abstract, 21) Addresses, 22) Affiliations, 23) Reprint Addresses, 24) Email Addresses, 25) Researcher Ids, 26) ORCID, 27) Funding Orgs, 28) Funding Name Preferred, 29) Funding Text, 30) Cited Reference Count, 31) Times Cited, WoS Core, 32) Times Cited, All Databases, 33) 180 Day Usage Count, 34) Since 2013 Usage Count, 35) Publisher, 36) Publisher City, 37) Publisher Address, 38) ISSN, 39) eISSN, 40) ISBN, 41) Journal Abbreviation, 42) Journal ISO Abbreviation, 43) Publication Date, 44) Publication Year, 45) Volume, 46) Issue, 47) Special Issue, 48) Start Page, 49) End Page, 50) Article Number, 51) DOI, 52) DOI Link, 53) Book DOI, 54) Early Access Date, 55) Number of Pages, 56) WoS Categories, 57) Web of Science Index, 58) Research Areas, 59) IDS Number, 60) Pubmed Id, 61) Open Access Designations, 62) Date of Export, 63) UT (Unique WOS ID), and 64) Web of Science Record. And Scopus: 1) Authors, 2) Author full names, 3) Author(s) ID, 4) Title, 5) Year, 6) Source title, 7) Volume, 8) Issue, 9) Art. No., 10) Page start, 11) Page end, 12) Page count, 13) Cited by, 14) DOI, 15) Link, 16) Affiliations, 17) Authors with affiliations, 18) Abstract, 19) Author Keywords, 20) Index Keywords, 21) Molecular Sequence Numbers, 22) Chemicals/CAS, 23) Tradenames, 24) Manufacturers, 25) Funding Details, 26) Funding Texts, 27) References, 28) Correspondence Address, 29) Editors, 30) Publisher, 31) Sponsors, 32) Conference name, 33) Conference date, 34) Conference location, 35) Conference code, 36) ISSN, 37) ISBN, 38) CODEN, 39) PubMed ID, 40) Language of Original Document, 41) Abbreviated Source Title 42) Document Type, 43) Publication Stage, 44) Open Access, 45) Source, and 46) EID.

### Quality assessment, risk of bias

In a first phase of quality assurance, a critical evaluation of the articles included was carried out, using the focus on well-being of brain migrants as a discriminant comparator, being an outcome of interest to observe the diversity of thematic categories selected.

The risk of bias of the included studies will be assessed according to Campbell et al. [37] in the case of theoretical articles and the Mixed Methods Appraisal Tool (MMAT) scale will be used for quantitative, qualitative, and mixed studies [38]. The MMAT scale is a valid measure of the methodological quality of the article. Two authors will review the studies independently, and a third author will be incorporated to settle tiebreakers.



**Fig. 1.** PRISMA flow diagram. \* Arts & Humanities Citation Index (A&HCI,1), Book Citation Index-Social Sciences and Humanities (BKCI-SSH, 2), Conference Proceedings Citation Index - Science (CPCI-S, 1), Conference Proceedings Citation Index-Social Sciences and Humanities (CPCI-SSH, 2), and Emerging Sources Citation Index (ESCI, 9). SSCI is Social Sciences Citation Index and SCIE is Science Citation Index Expanded.

Mixed Methods Appraisal Tool (MMAT), a checklist used in systematic reviews based on synthesis of qualitative and quantitative evidence, includes criteria for the evaluation of mixed studies; it defines the study category, and 7 items are applied according to a score from zero to one, to obtain a final percentage mean. Studies are considered as high quality > 75 %, moderate quality 50–74 %, and low quality < 49 %. Studies with values below 75 % were excluded from the category analysis and discussion [39].

The Fig. 1 and Table 2 shows characteristics of the first 27 studies, 89 % are doubly indexed in WoSCC and Scopus, segregated according to their focus on the well-being of highly skilled migrants ('brain migrants'); specifically, the nine selected studies are shown in Table 3. In addition, Table 3 summarizes the nine articles focused on well-being of brain migrants, with diverse methodological characteristics, and whose reported funding is shown in Table 4.

First, the three theoretical articles focused on the well-being of skilled migrants in the face of the ethical and moral aspects of brain drain [58,59,66], the three theoretical studies were reviewed with Campbell et al. [37]. The other six empirical articles are again subdivided methodologically, and satisfactorily checked with MMAT:

**Table 2**  
Characterization of twenty-seven selected articles according to PRISMA-ScR guidelines.

Authors	Journal	Publ. Year	Keywords on BM	National Affiliation	Cited Reference Count	Times Cited, WoS Core	Number of Pages	WoS Index	Scopus parallel indexing	WoS Categories (Outcomes)	Well-being mentions <sup>a</sup>	Focus on Well-being of brain migrants (Comparator)
Abella, M [40]	Int. Indig. Policy J.	2013	N.R.	N.R.	143	4 <sup>b</sup>	42	Scopus <sup>c</sup>	N.A.	Anthropol.; Soc. Sci., Interdiscip.	5	No
Ani, El	Philos.-Int. J. Philos.	2021	N.R.	Ghana	27	0	18	A&HCI	Yes	Philos.	4	Yes
Bao, C; Zhao, XM; Li, Y; Li, Z [41]	Sustainability	2023	brain drain	China	58	0	17	SCI-E; SSCI	Yes	Green & Sustain. Sci. & Technol.; Environ. Stud.	1	No
Cekanavicius, L; Kasnauskienė, G [42]	Inz. Ekon.	2009	brain drain	Lithuania	36	16	9	SSCI	Yes	Econ.	1	No
Gatwiri, K; Amboko, J; Okolla, D [43]	Soc. Theory Health	2020	brain drain	Australia; Kenya	58	3	16	SSCI	Yes	Soc. Sci., Biomed.	11	No
Göler, D; Krišjāne, Z [44]	Comp. Popul. Stud.	2024	N.R.	Latvia	64	0	23	ESCI	Yes	Demogr.	9	No
Jin, BH; Li, L; Rousseau, R [45]	J. Am. Soc. Inf. Sci. Technol.	2004	N.R.	Belgium; China	31	14	7	SCI-E; SSCI	Yes	Comput. Sci., Inf. Syst.; Inf. Sci. & Libr. Sci.	2	No
Li, Q; An, L; Zhang, R	Econ. Model.	2023	brain drain	China; USA	71	0	14	SSCI	Yes	Econ.	9	Yes
Mackey, TK; Liang, BA [46]	Health Policy	2012	brain drain	USA	40	40	8	SCI-E; SSCI	Yes	Healthc. Sci. & Serv.; Health Policy & Serv.	1	No
McWha-Hermann, I; Marai, L; Maclachlan, M; Carr, SC [47]	Int. Perspect. Psychol. Res. Pract. Consult.	2021	N.R.	United Kingdom; Papua New Guinea; Ireland; New Zealand	15	3 <sup>b</sup>	4	Scopus	N.A.	Clin. Psychol., Soc. Psychol., Appl. Psychol. <sup>d</sup>	2	No
Munkongsujarit, S [48]	Portl. Int. Conf. Manag.	2014	brain drain	Thailand	39	0	7	CPCI-S	Yes	Eng., Electr. & Electr.	2	No
Palalic, R; Durakovic, B; Ramadani, V; Ferreira, JJM	Thunderbird Int. Bus. Rev.	2023	brain drain	Oman; Bosnia & Hercegovina; North Macedonia; Portugal	104	4	15	ESCI	Yes	Bus.	17	Yes
Papapicco, C; D'Errico, F; Mininni, G	World Futures	2021	brain drain	Italy	24	6 <sup>b</sup>	19	Scopus	N.A.	Philos. <sup>d</sup>	11	Yes

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Table 2 (continued)

Authors	Journal	Publ. Year	Keywords on BM	National Affiliation	Cited Reference Count	Times Cited, WoS Core	Number of Pages	WoS Index	Scopus parallel indexing	WoS Categories (Outcomes)	Well-being mentions <sup>a</sup>	Focus on Well-being of brain migrants (Comparator)
Pradhan, P., et al. [49]	Earth Future	2021	N.R.	Germany; Nepal; Sweden; Thailand; England; USA; Austria	50	31	14	SCI-E	Yes	Environ. Sci.; Geosci., Multidiscip.; Meteorol. & Atmos. Sci.	2	No
Safina, D [50]	Proc Econ Financ	2015	brain drain	Russia	5	22	5	CPCI-SSH	No	Bus., Financ.; Econ.; Hosp., Leis., Sport & Tour.	1	No
Siankam, B	Psicosoc. Interv.	2011	N.R.	USA	72	3 <sup>b</sup>	13	Scopus <sup>c</sup>	N.A.	Psychol. Multidiscip.	13	Yes
Singh, B	Int. J. Qual. Health Care	2023	brain drain	Nepal; China	7	0	3	SCI-E; SSCI	Yes	Healthc. Sci. & Serv.; Health Policy & Serv.	7	Yes
Smetkowski, M [51]	Eur.-Asia Stud.	2013	N.R.	Poland	30	30	26	SSCI	Yes	Area Stud.; Econ.; Political Sci.	2	No
Stark, O [52]	Ekonomista	2010	brain drain	Poland; Austria	0	0	10	SSCI	No	Econ.	5	No
Stokes, F;	J. Bioethical Inq.	2021	brain drain	USA; Canada	64	12	11	SCI-E; SSCI	Yes	Ethics; Med. Ethics; Soc. Issues; Soc. Sci., Biomed.	4	Yes
Iskander, R	Int Cult Psychol	2010	brain drain	USA; New Zealand	77	3	22	BKCI-SSH	No	Psychol., Educ.; Psychol., Dev.	2	No
Thompson, LF; Atkins, SG [53]	Soc. Indic. Res.	2022	brain drain	Italy	49	0	19	SSCI	Yes	Soc. Sci., Interdiscip.; Sociol.	2	Yes
Torrisi, B; Pernagallo, G	Sustainability	2022	brain drain	Turkey	74	3	20	SCI-E; SSCI	Yes	Green & Sustain. Sci. & Technol.; Enviro. Sci.; Environ. Stud.	2	No
Usman, MAM; Ozdeser, H; Cavusoglu, B; Aliyu, US [54]	J. Pak. Med. Assoc.	2014	brain drain	Pakistan	14	7	3	SCI-E	Yes	Med., Gen. & Intern.; Med., Res. & Exp.	3	No
Vertejee, SS; Karamali, NN [55]	J. Int. Migr. Integr.	2022	brain circulation, brain drain	South Africa	42	2	22	ESCI	Yes	Demogr.	2	Yes
Wang, GYH	Int. Mark. Rev.	2023	N.R.	United Kingdom	51	0	22	SSCI	Yes	Bus.	15	No
Yen, DA-W; Cappellini, B; Hendy, JD; Jen, M-Y [56]	J. Build. Eng.	2023	N.R.	China	129	0	17	SCI-E	Yes	Constr. & Build. Technol.; Eng., Civ.	128	No
Zhang, Y; Li, Y; Xue, X; Dou, Y; Zhang, R [57]												

<sup>a</sup> In full-length documents and including the word "wellbeing".<sup>b</sup> Times Cited in Scopus.<sup>c</sup> Currently indexed in ESCI of WoSCC.<sup>d</sup> Scopus Categories.<sup>e</sup> Currently indexed in SSCI of WoSCC.

**Table 3**

Characterization of nine articles on well-being in brain migration resulting by PRISMA-ScR guidelines.

Authors (Year)	Affiliation (Dept. / Ctr. / Sch.)	Method (Comparator)	Migrant population analyzed (Comparator)	Sample (n) (Comparator)	Constructs (Outcomes)	Items (Outcomes)
Ani, El [58]	Dept. of Philosophy and Classics	Theoretical	Individual migrant	Non-applicable	Moral duty of the skilled migrant	Duty to assist poor compatriots; Duty to remain in the origin State; Permissibility of the poor State to use emigration restrictions; Legitimacy of rich State to restrict immigration against brain drain.
Stokes, F; Iskander, R [59]	Ctr. for Ethics and Human Rights; Dept. of Medicine	Theoretical	Migrant nurses	Non-applicable	Health personnel migration dilemmas	Cross-cultural labor conflicts (foreign and local); Conflicts between health personnel and health systems; Conflicts between health outcomes (departure country) and rights and freedoms to migrate.
Torrissi, B; Pernagallo, G [60]	Dept Econ & Business	Mixed - Questionnaire (included UWES-17)	Italian scholars	1474	Socio-labor characteristics (SLC) Satisfaction and Working Environment (SWE) Work Engagement Scale (WES, UWES-17)	SLC: Conciliation private life with professional life; Perception of the economic condition; Job stability; Agreement between personal aspiration and workplace; Propensity to work in resident country; Propensity to work in a foreign country. SWE: Overall organization; Assessment of the appropriateness of the workplace; Satisfaction about policies supporting research; Satisfaction with the administrative system supporting your activities; Career prospects; Evaluation of working hours; Relations with senior colleagues; Relations with peers; Assessment on the availability of scientific equipment; Similarities among teams; Satisfaction with the academic bureaucracy; Safety on the workplace; Satisfaction with salary and distribution of research funds. WES: Vigour dimension (VI); Dedication dimension (DE); Absorption dimension (AB).
[61])	Ctr Excellence Scientometr. & STI Policy	Qualitative - Document analysis and in-depth interviews	Shenzhen migrant talents	Non reported	Return decision to the origin country	Non-applicable
Li, Q; An, L; Zhang, R [62]	Public Adm. Sch.; Dept. of Economics and Geography; Dept Finance & Econ.	Quantitative, ordinary least square (OLS) with Lasso approach	National secondary data: FSI –FFP*, WGI – World Bank**, and others international database.	130 countries	Corruption Perception Index (CPI); Other Governance Qualities (OGQ); Vector of Control Variables (VCV).	CPI: CPI (WGI), Freedom from corruption, Bayesian Corruption Index. OCG: Government Effectiveness; Political Stability and Absence of Violence/Terrorism; Regulatory Quality; Rule of Law; Voice and Accountability. VCV: GDP; Human Development Index; Unemployment rate; Average of exposure to PM2.5; Religion Fractionalization; Business Freedom; Ongoing conflict; Land surface area within 100 km of the nearest ice-free coast (%); and Instruments (Constructed cousin marriage, Absence of a preference for cousin marriage, Political succession of local community is councils, or other collective body, Latitude, Percentage of the land surface area that have Tropical climate).

(continued on next page)

Table 3 (continued)

Authors (Year)	Affiliation (Dept. / Ctr. / Sch.)	Method (Comparator)	Migrant population analyzed (Comparator)	Sample (n) (Comparator)	Constructs (Outcomes)	Items (Outcomes)
Palalic, R; Durakovic, B; Ramadani, V; Ferreira, JJM [63]	Management Dept.; Ind & Mech Engn Dept; Res. Unit Business Sci.	Quantitative - Survey / CFA-SEM	Sarajevo university students	276	Entrepreneurship legal framework (ELF); Reasons to migrate (R2 M); Living standard (LS)	ELF: Guaranteed business infrastructure for young entrepreneurs; Business conditions for women entrepreneurs. R2M: For a better level of education; For a better standard of living; For a better job security. LS: Truly joyful life; Enough salary to live it up; Retirement expectations; Very acceptable living standard; Quite good education (compare with EU).
Papapicco, C; D'Errico, F; Mininni, G. [64]	Depart. of Education, Psychology, Communication Sci.	Mixed - Narrative interviews / Automatic analysis of facial expressions	Brain drainers in Italy	18	Emotions about mobility in 4 phases:	Emotions: joy, sadness, anger, fear, and surprise. Phases: reconstruction of the mobility experience, deepening of the emotionality related to mobility, affections, or social capital (relational affect), strategies considered useful to face potential difficulties ("coping strategies").
Siankam, B. [65]	Depart. of Human and Organization Development	Qualitative - semi structured interview	Sub-Saharan African migrant physicians in the U.S.	30	Eco-psychopolitical process	Process: wellness, oppression, and liberation/empowerment Emergent categories: The pursuit of individual and relational wellbeing. Medical training "forcing" as a source of oppression. Discontents about the political leadership. Macro/international structural oppression.
Singh, B. [66]	Depart. of Medicine, Depart. of Neurology	Theoretical (Perspective)	Nepal Physicians	Non-applicable	Scenario, Challenges, and Strategies	Scenario: Employability and working conditions. Challenges: Infrastructure improvement, Insufficient laws for doctor safety, Ineffective health insurance, Uncontrolled privatization, Declining doctor-patient relationship, Burnout-Depression-Suicide, Inadequate doctor recruitment, Limited government positions, Attacks on physicians, Lack of doctor protection, and Brain drain. Strategies: Strengthening healthcare workforce, Promoting physician well-being, Addressing public health concerns.

\* Fund for Peace's Fragile States Index (FSI) (2023).

\*\* World Bank's Worldwide Governance Indicators (WGI) [67].



**Table 4**

Funding of nine articles on well-being in brain migration resulting by PRISMA-ScR guidelines.

Authors (Year)	Institutional Affiliation	Funding
Ani, El [58]	University of Ghana, Ghana.	Non reported
Stokes, F; Iskander, R [59]	Amer Nurses Assoc, United States; McGill University, Canada.	Non reported
Torrisi, B; Pernagallo, G [60]	University of Catania, Italy.	Non reported
Wang, GYH [61]	Stellenbosch University, South Africa.	Non reported
Li, Q; An, L; Zhang, R [62]	Guangzhou University; University of North Florida; Texas State University San Marcos.	National Social Science Fund of China [22 ZD192].
Palalic, R; Durakovic, B; Ramadani, V; Ferreira, JJM [63]	Sultan Qaboos University, Oman; International University of Sarajevo, Bosnia & Herzegovina; South East European University, North Macedonia; Universidade da Beira Interior, Portugal.	Non reported
Papapicco, C; D'Errico, F; Mininni, G. [64]	University of Bari, Italy.	Non reported
Siankam, B. [65]	Vanderbilt University, United States.	Vanderbilt University
Singh, B. [66]	Tongji University, China.	Non reported

**Table 5**

Synthesis of results for Scoping Review on well-being in “brain migration” studies.

Crossing categories		Epistemic approach and study method	
		Ethical-Philosophical and Public Health approach with theoretical and qualitative methods	Business, Economic, and Political approach with quantitative and mixed methods.
Type of population analyzed	Medical brain drains	Studies focusing on rootedness/concern – origin country [59,65,66]	No cases found
	General brain migrants	Studies focusing on rootedness/concern – origin country [58,61]	- - -
		- - -	Studies focusing on individual well-being – destination country [62,64]
	Students	No cases found	Studies focusing on individual well-being – destination country [60,63]

- 1) The qualitative studies based on in-depth interviews analyzes the well-being around: 1.a) the decision to return to the country of origin, relating it to social relationships and brain circulation [61], and 1.b) eco-psychopolitical process (wellness, oppression, and liberation/empowerment) in medical brain drain [65].
- 2) The mixed articles 2.a) relate well-being with psycho-occupational aspects of brain drainers in their immediate work environment [60], and 2.b) emotional expressions of well-being (joy, sadness, anger, fear, and surprise) related to their personal experience of brain circulation mobility [64].
- 3) The quantitative article based on macro country data focuses econometrically on the effect of well-being with the Control of Corruption Indicator (WGI) on the Human Flight and Brain Drain Indicator (FSI) [62].
- 4) The quantitative article based on surveys focuses psychometrically on expectations regarding better well-being [63].

## Results synthesis

For synthesizing the results, we have used the method, the migrant population analyzed and the sample (including the alternative of not applying a sample) as comparative elements, contributing to the process of establishing study categories on brain migrants. As outcomes, we have focused on the constructs studied and the items that compose or disaggregate these constructs.

Thus, we could separate the works included in this review, by connecting the theoretical and one qualitative works found with aspects linked to rootedness and the concern about the effects of the brain drain at origin, from a critical and social vision of development [58,59,61,65,66]. Additionally, we consider quantitative and mixed works with a view towards the effects on individual well-being of brain drainers and their processes of insertion, adaptation, and permanence in the destination country with the business, economic, and political contextual factors of their new environment [60,62–64].

Among the empirical works with primary source data there are also observable differences in the populations studied, on the one hand, working with brain migrants and the accounts of their experiences ([64,65], and [61]) and on the other hand only with students and the psychometric measurement of their perceptions as potential brain migrants ([60], and [63]).

Showing a focus of studies on the medical brain drain: 1) physicians ([65], and [66]) and 2) nurses [59]. In all three cases, the papers highlight the concern about the effects of the brain drain in the countries of departure, with a critical view of development (see Table 5).

Thus, the synthesis of results for the Scoping Review on well-being in “brain migration” studies identify that: 1) Ethical-philosophical and public health studies (theoretical and qualitative) on this topic have focused on studying well-being in medical

brain drain and migrant brains in general. 2) Business, economic, and political studies (quantitative and mixed) have focused on the well-being perception of students as potential brain migrants and the well-being of brain migrants in general. On the other hand, within this study, 3) no ethical-philosophical and public health studies (theoretical and qualitative) have been found on the well-being of students as potential brain migrants, and 4) no business, economics, and policy studies (quantitative and mixed) have been found on the well-being of medical brain drainers.

## Conclusion

In recent decades, researchers' interest in migrants and well-being has focused on objective well-being in terms of the economic effect and quality of life of both migrants and their families. Subjective well-being focuses on job satisfaction and the standards of living they achieve. Studies on brain drain/gain have focused on the factors that drive this migration, mainly from economic, wage, personal, and educational perspectives. In general, brain migration is analysed from the perspective of favoured places of migration, both for their interest in disciplinary development, job opportunities, and network generation in a cultural, institutional, and social context, and the barriers imposed by foreign countries from the perspective of exclusion, migration policies, and intellectual property rights, among others.

In this context, 100 initial articles (excluding repetitions) were selected from the WoSCC and Scopus to obtain, through the PRISMA-ScR method, six articles specifically focused on the study of well-being in brain migration (high-skills migrants). Among this selection of studies (theoretical, quantitative, qualitative, and mixed), we focused on studies identifying the constructs within which well-being is studied in cases of brain drain, brain gain, and brain circulation (brain migration). On the one hand, researchers in the health, scientific policy, and philosophy fields focus on well-being, deepening the rootedness to the origin country, ethical and moral dilemmas of the individual's decision to leave, and potential return. On the other hand, researchers associated with the economics and business fields analyse the well-being resulting from the business, economic, and political aspects of the destination country.

## Ethics statements

Not applicable.

## CRediT author statement

Conceptualization, A.V.-M and P.G.-G.d.M.; methodology, A.V.-M.; validation, G.S.-S.; formal analysis, A.V.-M.; data curation, A.V.-M., and G.S.-S.; writing—original draft preparation, A.V.-M. and G.S.-S.; writing—review and editing, A.V.-M. and P.G.-G.d.M.; supervision, P.G.-G.d.M.; project administration, A.V.-M. All authors have read and agreed to the published version of the manuscript.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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