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Review

Psychosocial barriers to healthcare use among individuals with diabetes mellitus: A systematic review

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ABSTRACT

Purpose: To conduct a systematic review regarding psychosocial barriers to healthcare use in individuals with diabetes mellitus, using a well-established model of health-service use as a theoretical framework.

Methods: We used database-specific controlled vocabularies and additional free text terms, and conducted searches via MEDLINE, EMBASE, PsycINFO, CINAHL, Web of Science, OVID Journals. Included studies were rated according to the UK National Institute for Health and

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Abbreviations: CINAHL, Cumulative Index to Nursing and Allied Health Literature (bibliographic database for nursing and allied health); DM, diabetes mellitus; T1DM, type 1 DM; T2DM, type 2 DM; GDM, gestational DM; DZD, German center for diabetes research; DDZ, German center for diabetes research in Düsseldorf; EMBASE, Excerpta Medica Database (bibliographic database for biomedicine); EMTREE, thesaurus used in EMBASE database; ERIC, Education Resources Information Center (bibliographic database for education); KvK, Karlsruher virtueller Katalog; MEDLINE, Medical Literature Analysis and Retrieval System Online (bibliographic database for medicine); MeSH, medical subject headings used in MEDLINE Database; NICE, National Institute for Health and Care Excellence; PsycINFO, Psychological Information Database; GP, general practitioner; HbA_{1c}, glycated haemoglobin; LDL, low-density lipoprotein; BRFSS, Behavioral Risk Factor Surveillance System.

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Care Excellence (NICE) criteria. A narrative data synthesis was conducted, using the Andersen model and developing categories from the included studies.

Principal results: In total, 2923 studies were identified, and 15 finally included. We identified barriers according to the main categories "population characteristics", "norms and values", and "healthcare services" on a contextual and individual level, as well as "health status". Frequently reported barriers were "socioeconomic status", and "physician characteristics". Ethnic minorities were frequently analysed and may have specific barriers, e.g. "cultural beliefs" and "language".

Major conclusions: We identified a broad range of barriers to healthcare use in individuals with diabetes mellitus. However, the number of studies is low. Further research is needed to analyse barriers in more detail considering special subgroups.

Contents

1. Introduction

Diabetes mellitus (DM) is highly prevalent and it has been estimated that by 2040 more than 640 million individuals will be affected worldwide [1,2]. DM is associated with several complications, including increased rates of cardiovascular disease, retinopathy, neuropathy and nephropathy, as well as poor mental health and an impaired quality of life [1,2].

Individuals with DM need to perform a wide range of tasks to deal with their condition, including participation in self-management programmes, handling of multiple medications, blood glucose measurement and frequent contacts with healthcare professionals [3]. Inability to adhere to this complex and diverse set of required tasks may contribute to the fact that patients fall short of attaining defined treatment goals, e.g. in terms of HbA_{1c} [4]. Among the self-management tasks, regular contact with diabetes healthcare services plays a key role in achieving treatment goals [3,5]. Psychosocial factors (e.g. adverse views about health, and low motivation) have been identified as potential barriers reducing the likelihood of healthcare use among individuals with DM

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[1] Shared first authorship.
[2] Shared last authorship.
[3] Deceased.

[6]. Although there are some systematic reviews that have addressed psychosocial factors in the context of diabetes care, such as psychosocial outcomes and interventions [7], and those addressing barriers to insulin use [8,9], none of the published reviews focused on psychosocial barriers to healthcare use. However, insights into the barriers related to healthcare use among individuals with diabetes might ease the achievement of diabetes treatment benefits [10]. Hence, the aim of this systematic review was to identify and synthesise currently available knowledge of individuals with DM in regard to psychosocial barriers to healthcare use. Identified barriers were analysed using a well-established model for healthcare use as a theoretical framework.

2. Methods

This systematic review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria [11]. Our endpoint is healthcare use, defined as "realised access" [12], and refers to "the actual use of services", as indexed, for instance, by the utilisation of physicians, hospital, dental and other health services [13].

As a theoretical basis, we drew on the well-established Andersen model, which describes determinants of the use of healthcare services [12]. We chose the Andersen model because it is widely used and also applied in diabetes research [14]. The Andersen model describes predictors and outcomes for healthcare use as part of health behaviour. The predictors are categorised as contextual and individual characteristics containing predisposing, enabling and need characteristics [13]. The "contextual characteristics" include organisational and provider-related as well as community-related characteristics [13,15]. Examples are the ethnic composition of a community according to "population characteristics", the state religion according to "norms and values" and the way care is organised according to "healthcare services". "Individual characteristics" are, for instance, the age and gender of an individual as well as people's social network. For our review looking for barriers to healthcare use, we defined "contextual factors" and "individual factors" as main categories according to the Andersen model, and therein developed categories from the included studies.

2.1. *Search strategy*

We searched in the Cochrane Library, MEDLINE, EMBASE, PsycINFO, CINAHL, Web of Science, OVID Journals, ScienceDirect, Sowiport, ERIC, MedPilot and Karlsruher virtueller Katalog (KvK) and included original studies that were published up to April 2015. The search was performed from April 21, 2015 to April 23, 2015. Moreover, we conducted backward citation tracking and a forward citation tracking was performed from December 27, 2016 to January 8, 2017. Further, we used other resources to search for potentially eligible studies, such as reference lists of review articles. The search strategy was developed by using database-specific controlled vocabularies (MeSH, EMTREE) and additional free text terms. Boolean operators and proximity operators were used. The search terms included were: Diabetes mellitus [MeSH], social, cultural, sociocultural, socioeconomic*, psychological*, health services/utilization [MeSH], barrier*, obstacle, hindrance, non-uptake, facilitator. Duplicate hits were removed. For details see Appendix A.

2.2. *Study selection process*

After a pre-test with 100 titles and abstracts to ensure adequacy of our inclusion and exclusion criteria, two independent reviewers (A.P., T.S.) selected potentially eligible publications by their title and abstract, and categorised them into "included", "unclear" and "excluded".

As a next step, the same reviewers analysed the full texts, labelled as "included" or "unclear", for final inclusion. The inter-rater reliability was determined by dividing the number of studies rated equally by both reviewers through the total number of rated studies. Discrepancies in all selection steps were resolved by discussion with two reviewers (S.K., A.I.).

2.3. *Inclusion and exclusion criteria*

We included quantitative, qualitative or mixed-method studies published in English or German. We used studies conducted on individuals with any type of DM and which took psychosocial barriers to healthcare use into consideration. Studies were only included if they explicitly mentioned the wording "healthcare use" or "access". Furthermore, the words "barrier" and "psychological", "social", "psychosocial" or related had to be used. Studies reporting barriers to individuals with DM from the point of view of relatives or healthcare professionals were also included. Additionally, studies dealing with other diseases besides DM or healthy participants were only included if the results for DM were reported separately. We did not include studies dealing with individuals at risk of developing DM. We did not restrict our studies to special populations or countries. Publications without references, letters or short reports, editorials, comments or discussion papers were excluded. However, they were screened to potentially identify further original studies.

2.4. *Data extraction and synthesis*

A data extraction sheet was developed in line with the Cochrane recommendations [16]. The general information extracted included: the study type, sample size and population characteristics, e.g. type of DM, origin of the participants and the country they live in. Since a number of identified studies analysed ethnic minorities (see results) and since it was suggested that there are different barriers to healthcare use in ethnic minorities [17,18], we looked for specific barriers in these groups.

The data synthesis (narrative synthesis) was conducted following the Cochrane methods for data analysis and synthesis [19]. Quantitative and qualitative data were described systematically, analysed and tabulated. The characteristics of the studies, including methodological aspects and important differences between them were described systematically. Core topics were stressed and described. The results from the content analysis of each study were summarised and similar findings were clustered. Deductive and inductive content analyses were performed [20–22] by structuring the identified barriers into categories and subcategories [20–22]. Furthermore, memos and diagrams were used to enhance the quality of our analysis [20]. The texts were coded by one coder (A.P.) and validated by a second coder (S.K.). The final codings were validated using a peer group process, synthesizing the barriers across all studies in an iterative way [20,22].

2.5. *Assessment of risk of bias in individual studies*

The risk of bias of the selected studies was determined independently by two reviewers (A.P., T.S. or S.K.) according to the quality criteria of the UK National Institute for Health and Care Excellence (NICE) [23]. The final rating of all the studies was checked by a third reviewer (S.K.).

3. Results

In total, 2923 studies were identified and 15 studies were ultimately included [24–38], 12 quantitative studies [24,26–34,37,38] and three qualitative ones [25,35,36]. Thereof, two studies were included deriving from backward citation tracking [34,35] and three studies deriving from forward citation tracking [36–38]. The most recent study was published in August 2015 [36]. An overview of the study selection process is shown in Fig. 1 and regarding the included studies an overview is shown in Table 1. The inter-rater reliability for the title and abstract screening was 95% and for the full-text screening about 80%.

Two studies reported barriers to healthcare use from the point of view of individuals with DM and from the healthcare professionals' perspective [25,38]. While most of the studies (n = 10) covered healthcare use in general [27–32,34–36,38], four studies addressed barriers to eye care use [24–26,37], and one study examined barriers to post-discharge follow-up [33].

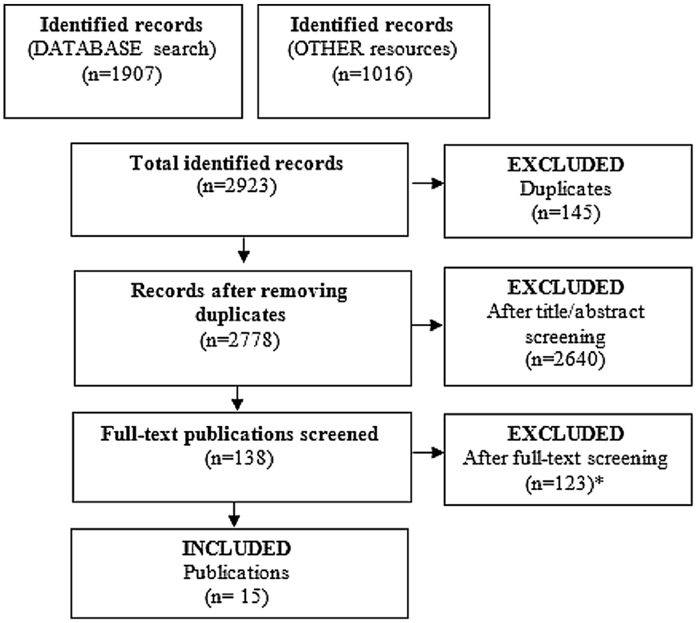
Six studies addressed exclusively or mainly members of an ethnic-minority population [25,28,31,33,35,36] while four other studies analysed the impact of ethnicity on psychosocial barriers [26,27,32,34]. The remaining five studies did not consider ethnicity in their analyses [24,29,30,37,38].

More than half (n = 9) of the studies were conducted in North America [25–28,30–34]. The remaining studies were conducted in Australia (n = 2) [29,36], Europe (i.e. Germany [37] and United Kingdom (UK) [35]) and Asia (i.e. Indonesia [24]). Moreover, there was one multinational study [38]. The sample size varied from 10 [25] to 27,699 [26] participants.

The critical appraisal showed that none of the studies met all the pre-specified quality criteria: four studies met most of the quality criteria [31,32,35,36], and the others (n = 11) fulfilled some of the quality criteria [24–30,33,34,37,38] (Table 1).

3.1. *Identified barriers to healthcare use*

We defined main categories: "population characteristics", "norms and values" and "healthcare services", each on a contextual and individual level following the Andersen model, as well as a fourth main category "health status", divided in "perceived health status" (how people view their own health)



***Excluded:**
§ 7 = article not available
# 41 = psychological and/or social not mentioned
$ 39 = access or healthcare use not explicitly mentioned
§ 16 = DM not separately mentioned
& 6 = barriers not mentioned
% 5 = lacking format of the article
^ 9 = more than one reason (3= # and $, 2 = # and &, 2= #, $ and &, 1= # and §, 1= $ and &)

Fig. 1 – Study selection.

Table 1 – Overview of included studies.

Author/year	Study type	Sample size	Diabetes type	Origin of the participants	Country where the participants live	Objectives	Findings	Critical appraisal
Adriono et al. 2011 [24]	Quantitative Study (cross-sectional study)	n = 196	T2DM	Not specified	Indonesia, Jakarta	The study explored eye care service use among individuals with diabetes living in urban Indonesia. Furthermore, reasons for missed examinations were investigated.	Only 15.3% of all participants received an eye examination within the last years. The most common barrier to eye care was lack of knowledge about diabetic retinopathy.	+ (pp 3/19; p 6/19; m1/19; NA 9/19)
Alzubaidi et al. 2015 [36]	Qualitative Study (content analysis of individual interviews and group interviews)	n = 100 Arabic-speaking = 60 English-speaking = 40	T2DM	Arabic-speaking immigrants and English-speaking Caucasians	Australia, Melbourne	This study compares the experiences of English-speaking Caucasians with those of Arabic-speaking immigrants when accessing healthcare in Australia.	The study identified four barriers to healthcare use, especially among the Arabic community: influence of significant other(s), unique sociocultural and religious beliefs, and experiences with healthcare providers and lack of knowledge about healthcare services.	++ (13/14)
Arora et al. 2013 [25]	Qualitative Study (qualitative review, content analysis of interviews)	n = 10 DM = 5	DM[a]	Canadian Aborigenes	Canada, Alberta	The study explored the way a culturally sensitive model of healthcare delivery in a community-based health clinic influenced the participation to eye care with tele-Ophthalmology among aboriginal individuals with diabetes living in Canada. Furthermore, the barriers impeding healthcare use were described interviewing different persons involved in care.	The intervention was successful in improving healthcare use in diabetes care. Economic, geographic, social and cultural barriers were identified.	+ (7/14)

– Table 1 (*Continued*)

Author/year	Study type	Sample size	Diabetes type	Origin of the participants	Country where the participants live	Objectives	Findings	Critical appraisal
Baumeister et al. 2015 [37]	Quantitative study (cross-sectional study)	1997–2001 n = 4,308 DM = 342 2008–2012 n = 4,402 DM = 456	T1DM&T2DM	Caucasian	North-eastern Germany	The study examined the development of diabetes prevalence and eye care utilisation in Eastern Germany. The study also analysed which factors were associated with a decline in eye care service utilisation.	Eye care utilisation in Eastern Germany has declined while prevalence of DM has risen. Especially individuals with diabetes with a low socioeconomic status, poor glycaemic control or comorbidities were less likely to receive recommended eye care.	+ (pp5/19; p5/19; m1/19; NA 8/19)
Chou et al. 2014 [26]	Quantitative study (cross-sectional study)	n = 27,699	DM[a] exclusion GDM	Non-Hispanic–White/ Black, non-Hispanic Asian, Hispanic, or others	United States of America	The study examined barriers to eye care among individuals aged older than 40 years using data of the Behavioral Risk Factors Surveillance System (BRFSS).	In total about 25% did not receive recommended eye care. Main reasons for not seeking eye care were no perceived need and lack of money/health insurance. The reasons differed according to socio-demographic characteristics.	+ (pp 3/19; p7/19; NA 9/19)
Gary et al. 2003 [27]	Quantitative study (cross-sectional study)	n = 9,443	DM[a] exclusion of GDM	Non-Hispanic–White/ Black, Hispanic and others	United States of America	The study explored racial differences concerning healthcare experiences in America using data of the BRFSS.	Key finding of the study was that ethnic minorities were less likely to have a health insurance and that they experienced greater cost-related barriers to healthcare use.	+ (pp3/19; p7/19; NA 9/19)
Heer et al. 2013 [28]	Quantitative study (cross-sectional study)	n = 1,002 DM = 154	DM[a]	Mexican	United States of America,– Texas	The study explored barriers experienced when accessing care among Mexican American border residents. Furthermore, crossing the border for seeking healthcare was analysed. The study compared barriers experienced by Mexican Americans with and without diagnosed diabetes.	Compared with healthy Mexican American border residents, individuals with diabetes were more likely to miss treatment due to a lack of money, transport or language barriers. Furthermore, many participants sought care in Mexico for example due to language problems. Seeking care in Mexico was not associated with having diabetes.	+ (pp6/19; p4/19; NA 9/19)

– Table 1 (*Continued*)

Author/year	Study type	Sample size	Diabetes type	Origin of the participants	Country where the participants live	Objectives	Findings	Critical appraisal
Karter et al. 2003 [34]	Quantitative study (cross-sectional study)	n = 11,922	DM[a]	Non-Hispanic-White/non-Hispanic-Black, Hispanic, Asian/Pacific Islanders and others	United States of America	The study explored the impacts of copayment on individuals with diabetes concerning the use of preventive services. Annual eye examinations, diabetes education and daily blood glucose monitoring among those treated with insulin were examined.	Copayment was associated with less diabetes care. This barrier to healthcare use was present among all participants and did not differ according to participants' characteristics, e.g. income.	+ (pp 2/19; p 8/19; NA 9/19)
Kibbey et al. 2013 [29]	Quantitative study (cross-sectional study)	n = 86	T1DM	74 Australian, rest not specified	Australia	The study explored the needs of young adults with T1DM. It analysed which factors hinder and which factors enable patients to use diabetes specialist care.	There were logistical barriers such as time constraints and transport. Furthermore, a previous unsatisfactory experience was identified as barrier.	+ (pp2/19; p6/19; – 2/19; NA 9/19)
Kollannoor et al. 2012 [31]	Quantitative study (descriptive cross-sectional study)	n = 211	T2DM	Latino	United States of America	The study analysed healthcare use barriers experienced by Latino patients. The four barriers – namely, enabling factor, doctor access, medication access and forgetfulness – were examined in detail regarding the influence of other characteristics especially food insecurity and self-efficacy.	Food insecurity was a risk factor for experiencing the enabling factor, medication access and forgetfulness barriers. Self-efficacy was protective against all barriers.	++ (pp9/19; p 1/19; NA 9/19)
Kwan et al. 2008 [30]	Quantitative study (cross-sectional study)	n = 1,150	T1DM, T2DM & GDM	Not specified	Canada	The study explored financial barriers to diabetes care.	The main outcome was that low income and lack of supplemental health insurance hindered healthcare use.	+ (pp3/19; p7/19; NA 9/19)

– Table 1 (*Continued*)

Author/year	Study type	Sample size	Diabetes type	Origin of the participants	Country where the participants live	Objectives	Findings	Critical appraisal
Peyrot et al. 2006 [38]	Quantitative study (cross-sectional study)	n = 8,931 DM = 5,104 DM care providers = 3,827	T1DM&T2DM	Not specified	Countries from Asia, Australia, Europe and North America	The study investigated diabetes care worldwide. Especially healthcare use, satisfaction, patient provider relation and prevention were examined. These factors were examined from patients' and providers' point of view.	Participants found it easy to access healthcare but still experienced financial barriers.	+ (pp3/19; p8/19; NA 8/19)
Rhodes et al. 2003 [35]	Qualitative study (content analysis of interviews)	n = 55 Bangladeshi = 12	T1DM&T2DM	Bangladeshi and others (e.g. Pakistani, Great Britain. . .)	United Kingdom (UK)	The study explored the experiences of Bangladeshi individuals living in the UK diagnosed with diabetes. Aim of the study was to understand which factors influenced the ability of these patients to use healthcare and how they experienced the British healthcare system. Furthermore the experiences were compared to participants of other ethnicities.	Bangladeshi experienced great barriers to healthcare use, for example, due to language problems and different culture.	++ (12/14)
Valenzuela et al. 2014 [32]	Quantitative study (cross-sectional study)	n = 780	T1DM	Hispanics, non Hispanic White/Black, American Indian, Asian, Pacific Islander, others	United States of America	The study examined barriers to healthcare use and to process of good care for American Youth with T1DM. The identified barriers were also analysed regarding the variation across socio-demographic factors.	Most of the participants experienced barriers to healthcare use. The most frequent barriers were cost, communication and getting needed information.	++ (pp9/19; p1/19; NA 9/19)

– Table 1 (*Continued*)

Author/year	Study type	Sample size	Diabetes type	Origin of the participants	Country where the participants live	Objectives	Findings	Critical appraisal
Wheeler et al. 2007 [33]	Quantitative study (cross-sectional study)	n = 303	DM[a]	91% African American, rest not specified	United States of America	The study explored barriers to post-discharge diabetes care. Measured barriers included: no transport, cannot afford visit, no insurance, cannot remember appointment and afraid of losing job. Furthermore, the relationship between the probability of anticipating a barrier and various socio-demographic factors and former experienced barriers was examined.	Half of the participants anticipated barriers to post discharge follow-up. The most frequently cited barriers were transport and financial problems including lack of health insurance. Participants were more likely to anticipate a barrier if they had experienced former problems accessing care.	+ (pp3/19; p/6/19; m1/19; NA 9/19)

Quantitative or qualitative studies (following NICE grading):

“(++) All or most of the checklist criteria have been met. In case they have not been fully met, it is unlikely that authors would have arrived at different conclusions if additional criteria had been met. (+) Some of the checklist criteria have been met, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter. (–) Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter” [23].

pp: ‘Indicates that for that particular aspect of study design, the study has been designed or conducted in such a way as to minimise the risk of bias.’

p: ‘Indicates that either the answer to the checklist question is not clear from the way the study is reported, or that the study may not have addressed all potential sources of bias for that particular aspect of study design.’

m: ‘Should be reserved for those aspects of the study design in which significant sources of bias may persist.’

NR (not reported): ‘Should be reserved for those aspects in which the study under review fails to report how they have (or might have) been considered.’

NA (not applicable): ‘Should be reserved for those study design aspects that are not applicable given the study design under review (for example, allocation concealment would not be applicable for case-control studies.’ [23]

[a] The type of diabetes mellitus was not specified.

Table 2 – Psychosocial barriers to healthcare use.

Categories	Psychosocial CONTEXTUAL	Psychosocial INDIVIDUAL
Population characteristics	**Socioeconomic status** [24,26–30,32–35] (e.g. healthcare costs [24,26–30,32–35], low socioeconomic-level neighbourhood [30]) **Infrastructure** [25,26,28,29,31,33,35] (e.g. transport [25,26,28,29,31,35], geographic barriers [25,26,28,31], distance [25,26,29,35]) **Language**[a] [25,28,31,35,36] **Demographic characteristics** [31] (e.g. ethnic composition [31])	**Socioeconomic status** [24–38] (e.g. lack of money [24–35,37,38], low income [37], lack of health insurance [26,28,30,31,33]; low education [24,36,37]: low literacy [24,36], unemployment [37]) **Mobility** [25,26,28,29,31,33,35] (e.g. no car [25,35], unfamiliarity with public transport system [35], expense of transport [35], perceived transport barrier [33]) **Language** [25,28,31,35,36] (e.g. dependence on a general practitioner speaking Arabic [36]/Bengali with bad consequences: no treatment if doctor is not available [35,36], even if dissatisfied reluctant to change due to language problems [35]) **Demographic characteristics** [26,30,31,35–37] (e.g. gender [31,35–37]: male [31,36,37] and female [35], Age <65 [30], minority racial status [31]) **Health Literacy** [24,26,28,35,36] (e.g. lack of knowledge of available services/unfamiliarity with the healthcare system [35,36], poor knowledge and awareness of DM [24,26,28,35,36]: lack of knowledge of necessity for regular check-ups [35] or of regular eye examinations [24] and of common symptoms of DM [36], no eye doctor known [26]) **Fear** [29,33,35,36] (e.g. fear of racist abuse when travelling by bus [35], fear of losing job if time is spent accessing care [33], fear of treatment escalation [36], fear of being judged by professionals for poor glycaemic control [29], fear of responsibility for DM self-management after diagnosis of DM [36]) **Social networks** [29,35–37] (e.g. living alone [37], strong dependence on social network concerning decision making [36], visits to Bangladesh [35], family network [29,35]: dependence on husband/family to interpret and accompany patients, often resulting in mistranslation, withholding of information and patients' concerns not being fully communicated [35], family commitments [29,35], caring and social duties [35]) **Forgetfulness**[a] [29,31,33] **Lifestyle** [37] (e.g. smoking [37], high alcohol consumption [37], obesity [37], lack of physical activity [37])
Norms and values	**Cultural beliefs** [25,31,35,36] (e.g. different cultural orientation [35,36], important role of traditional healers [25], absence of cultural rituals and ceremonies [25] dislocation from cultural support system in clinics [25], cultural priorities impeding diabetes care [25], perception of discrimination and isolation [25], perception that government is disrespectful due to former conflicts [25]) **Social beliefs** [25,35,36] (e.g. women have to stay at home [35], men should not care about their own health [36], preference of a "wait and see" strategy [36], significant others have to be involved in decision-making resulting in dependency [36], duty to practise 40 days of mourning without leaving the house [35], racism [25,35] stigma [25,36], DM is perceived as predicament without solution resulting in the belief that it is better not to know [36], perception that doctors are only for emergencies [36]) **Religious beliefs** [35,36] (e.g. fatalistic attitude [36], suffering from DM means being close to Allah [36], commitment to religious beliefs [36], chiropody services are perceived insufficient to meet the standards of personal cleanliness and grooming required for ritual observances and prayer [35])	**Perceptions on healthcare system** [24,29,31,35,36] (e.g. distrust and dislike of specialists: specialists are perceived as judgmental and strict [36], perceived lack of emotional and social understanding [36], feeling of being blamed for their condition [36], sense of privacy concerning health-related issues thus only family members accepted to interpret [35], feeling that examination is inconvenient [24], preference for alternative medicine [35], perceived lack of competence of healthcare workers [35], perceived lack of support and education services [29], experiences within healthcare system [29,33,35,36]: previous unsatisfactory experience within the healthcare system [29,36], doctors deemed former issues to be trivial [36], fatalistic acceptance of low-quality care [35])

– Table 2 (*Continued*)

Categories	Psychosocial CONTEXTUAL	Psychosocial INDIVIDUAL
Healthcare services	**Physician characteristics** [25,28,29,31,32,35–37] (e.g. communication [25,28,29,31,32,35,36]: lack of information provision [29,35], of contextual care [35], of acknowledgment as individual [29], and of patient-centred approach [35], use of difficult-to-understand language [28], lack of cultural competence [25,35,36]; physician's manner [35]: always in a rush [35], no emotional support [35]; lack of competence [35,37] sometimes resulting in delayed diagnosis of DM [35]: lack of awareness of common symptoms of DM among healthcare professionals [35], physician's lack of awareness of necessity for screening for diabetic retinopathy [37], physicians do not tell patients to go to check-ups because they believe it is the patient's responsibility [35]) **Coordination**[a] [29] **Resources** [25,29,32,35] (e.g. no regular physician [32], lack of time with doctor [35], changing physicians/inability to see the same doctor [35], lack of competent interpreters [35], clinics focusing only on T2DM [29], lack of culturally appropriate services [25,35]: lack of gender specification [35], lack of community resources [31]: doctor–patient ratio [31]) **Appointments** [26,29,35] (e.g. difficulties with the appointment system [35], no appointment available [26], long waiting time [29]) **Difficulties of access** [31] (e.g. medication access [31], doctor access [31], referrals [31]) **Orientation in healthcare services** [36] (e.g. Anglo-centric healthcare system resulting in difficulties navigating through the healthcare system for foreign people/immigrants [36])	**Therapy of DM** [29,37] (e.g. therapy with oral glucose-lowering drug and insulin [37], fatigue from continual care burden [29], disillusionment with ongoing effort [29]) **Use of healthcare services** [37] (e.g. visit of GP within 12 months [37]) **Coordination** [25,29,35] (e.g. difficulty to take time off work [35])

[a] No examples provided.

and "evaluated health status" (the way professionals judge the individual's health as well as objective measures related to health status [13]). An overview of the selected barriers to healthcare use is shown in Table 2.

3.1.1. "Population characteristics"-related barriers

Barriers relating to "population characteristics" at the contextual level included "socioeconomic status" (n = 10) [24,26–30,32–35], e.g. healthcare costs, "infrastructure" (n = 7) [25,26,28,29,31,33,35], e.g. transport, geographic barriers and distance, "language" (n = 5) [25,28,31,35,36], and "demographic characteristics" (n = 1) [31], e.g. ethnic composition.

There are nine barriers relating to "population characteristics" on the individual level. The most frequently described barrier is "low socioeconomic status" (n = 15) [24–38] which includes lack of money [24–35,37,38], lack of health insurance [26,28,30,31,33] and low education [24,36,37]. Other barriers are "mobility" (n = 7) [25,26,28,29,31,33,35] containing problems due to no car ownership [25,35] or unfamiliarity with public transport system [35], "demographic characteristics" (n = 6) [26,30,31,35–37] such as gender [31,35–37] (e.g. male [31,36,37] and female [35]), age of less than 65 years [30] and "language" (n = 5) [25,28,31,35,36]. Furthermore, "health literacy" (n = 5) [24,26,28,35,36] especially lacking knowledge and awareness of DM (n = 5) [24,26,28,35,36], "social networks" (n = 4) [29,35–37], "fear" (n = 4) [29,33,35,36], e.g. fear of racist abuse when travelling by bus [35] or fear of losing job if time is spent accessing care [33], "forgetfulness" (n = 3) [29,31,33] and "lifestyle" (n = 1) [37] were described.

3.1.2. "Norms and values"-related barriers

Barriers relating to "norms and values" on the contextual level were "cultural beliefs" (n = 4) [25,31,35,36], e.g. different cultural orientation [35,36], important role of traditional healers [25], "social beliefs" (n = 3) [25,35,36] e.g. women have to stay at home [35], men should not care about their health [36] and "religious beliefs" (n = 2) [35,36], e.g. fatalistic attitude [36], suffering from DM means being close to Allah [36]. Those beliefs were typical for ethnic-minority individuals with DM. There were different beliefs among Aborigines whose beliefs were deep-rooted and who often perceived discrimination and isolation and were afraid of losing their connection to nature in hospitals [25], or among Muslims who often delayed healthcare use because they believed that everything happened due to Allah's will [35,36].

At the individual level, the only barrier identified was "perceptions of the healthcare system" (n = 5) [24,29,31,35,36]. Examples are distrust and dislike of specialists [36], perceived

Table 3 – Health status–related barriers.

Main categories	Subcategories	Health status
Perceived health status	General quality of life [24,26,29,37]	Lower health-related quality of life [37] Lower perceived health [37] No (perceived) need [24,26] Low mental health-related quality of life [37] Feeling of disempowerment [29]
	Handling of symptoms [35,36]	Ignorance of diabetic symptoms [35,36] (e.g. feeling symptoms are not important [35]) General burden of illness overshadows diabetic symptoms, which are not perceived as important [35] Misinterpretation of symptoms [35,36] (e.g. as cumulative stress [36], spiritual interpretation [35])
Evaluated health status	Health status measures [24,37,38]	Diabetes complications [38] Poor glycaemic control [37] (e.g. high HbA_{1c} [37]) >5 years since diagnosis of DM [37] Comorbidities [24,37] (e.g. physical disability [24], high blood pressure [37], dyslipidaemia [37])

lack of emotional and social understanding [36] and preference for alternative medicine [35].

3.1.3. *"Healthcare services"-related barriers*

Most of the barriers relating to "healthcare services" were on the contextual level (n = 9) [25,26,28,29,31,32,35–37], such as "physician characteristics" (n = 8) [25,28,29,31,32,35–37], "resources" (n = 4) [25,29,32,35], "coordination" [29], "appointments" (n = 3) [26,29,35], "difficulties of access" (n = 1) [31] and "orientation in healthcare services" [36]. "Physician characteristics" (n = 8) [25,28,29,31,32,35–37] included, for example, communication barriers (n = 7) [25,28,29,31,32,35,36], physician's manners [35] and lack of competence of physicians (n = 2) [35,37]. Some participants reported having received a delayed diagnosis of DM (n = 1) [35] due to a lack of awareness among physicians about the common symptoms of DM. Communication barriers (n = 7) [25,28,29,31,32,35,36] comprised lack of information provision (n = 2) [29,35], use of difficult-to-understand language (n = 1) [28] or lack of contextual care [35]. "Resources"-related barriers [25,29,32,35] consisted of, for example, no regular provider [32], lack of time with physician [35] and lack of culturally appropriate services [25,35] such as gender-specific services [35].

Barriers relating to "individual healthcare services" were "coordination" (n = 3) [25,29,35], "therapy of DM" (n = 2) [29,37] and "use of healthcare services" [37]. Kibbey et al. identified some barriers on the individual level that were unique for adolescents with T1DM, according to "therapy of DM": disillusionment with ongoing effort and fatigue from continual care burden [29]. Some adolescents experienced great disappointments due to the need for lifelong therapy and lifestyle changes, often without achieving sufficient glycaemic control [29].

3.1.4. *"Heath status"-related barriers*

According to the Andersen model, "health status-related barriers" (Table 3) were categorised into "perceived health status-related barriers" and "evaluated health status-related barriers".

There were two main types of "perceived health status-related barriers": "general quality of life" (n = 4) [24,26,29,37] and "handling of symptoms" (n = 2), e.g. ignorance of symptoms or misinterpretation of symptoms [35,36]. For "general quality of life" (n = 4) [24,26,29,37] four studies described that individuals who were less satisfied with their health were less likely to use healthcare services (n = 4) [24,26,29,37]. Furthermore, those who did not perceive a need were less likely to make use of recommended eye care (n = 2) [24,26].

Regarding "evaluated health status-related barriers", a health status evaluated as poor (i.e. based on more objective indicators) (n = 3) [24,37,38] and longer duration of DM since diagnosis [37] were shown to have negative impacts on healthcare use. More precisely, the authors identified DM complications [38], poor glycaemic control [37] and comorbidities, for example physical disability [24], high blood pressure or dyslipidaemia [37], as potential barriers to healthcare use.

3.2. *Barriers in ethnic minorities*

Six of the included studies were conducted primarily or exclusively among ethnic-minority populations [25,28,31,33,35,36]: three studies addressed exclusively members of an ethnic-minority population [25,28,31], one study primarily dealt with African–American participants [33] and two studies focused on ethnic-minority participants and identified some barriers that were only present among ethnic-minority participants [35,36]. These studies described several specific barriers, for example "language" (n = 5) [25,28,31,35,36], e.g. dependence on a GP speaking Arabic [36]/Bengali [35] (n = 2), "cultural beliefs" (n = 4) [25,31,35,36], "social beliefs" (n = 3) [25,35,36], and "religious beliefs" (n = 2) [35,36].

Other barriers resulting from different cultural backgrounds were lack of cultural competence (n = 3) [25,35,36] referring to "physician characteristics" and lack of culturally appropriate services (n = 2) [25,35], such as gender-specific services [35] referring to "resources". With reference to "health literacy", unfamiliarity with the healthcare system/lack of knowledge of available services (n = 2) [35,36] was only identified as a barrier in ethnic minorities.

Furthermore, Rhodes et al. and Alzubaidi et al. addressed barriers due to "perceived health status" and identified poor handling of symptoms (n = 2) [35,36] as a barrier: some participants seemed to believe initially that their symptoms were explained by stress [36] or spiritual factors [35]. Furthermore, both studies showed that a lot of participants initially ignored their symptoms (n = 2) [35,36].

4. Discussion

This is the first systematic review addressing psychosocial barriers to healthcare use of individuals with DM. Upon identification of 15 studies in total, we used the Andersen model as a theoretical framework to summarise the observations. We identified individual and contextual psychosocial core barriers of healthcare use related to three main categories: "population characteristics", "norms and values" and "healthcare services", as well as barriers related to "health status". The most frequently described subcategories were: "socioeconomic status", including lack of money and low education, "mobility" and "physician characteristics". Ethnic minorities were considered in ten of the 15 studies.

Studies showed that socioeconomic status is associated with the prevalence of T2DM [39] and that a low socioeconomic status results in limited healthcare access and poor patient outcomes, e.g. higher rates of diabetic eye disease [40]. In this context, the concept of health literacy may be considered: low health literacy is often found among individuals with a lower socioeconomic status, and is associated with limited access to healthcare [41]. Strategies as for example disease management programmes which address patients, barriers resulted in better HbA_{1c} values in particular among patients with low health literacy [42].

"Norms and values"-related barriers such as "cultural beliefs" [25,31,35,36], "social beliefs" [25,35,36] and "religious beliefs" [35,36] seem to be common among individuals with different cultural backgrounds; this finding is also confirmed by a review of Marrone: the different cultural orientations of members of indigenous people and their provider resulted, for example, in communication barriers even if both were capable of communicating in the same language. Furthermore, different health perceptions lead to difficulties in therapy [43].

Most of the barriers relating to "healthcare services" were contextual barriers. Communication barriers with physicians were often described. Favourable modification of patients' health behaviour requires adequate communication between individuals with DM and their physicians and is built mainly on adequate communication skills of the physician. Van Dam et al. stated that interventions addressing the quality of patient-provider relationships were suitable to improve outcomes among individuals with DM while improving patient empowerment resulted in even better outcomes [44]. Also Janes et al. described that non-response to the patients' feelings is one of the greatest barriers to glycaemic control [45]. In this context, patient-provider relationship is a very important factor influencing diabetes outcomes, e.g. a lot of providers still have a paternalistic attitude impeding a "positive therapeutic relationship" [46]. A more patient-centred approach combined with promotion of patient empowerment might improve diabetes knowledge, medication adherence and diabetes self-care [45,47].

Individuals who were less satisfied with their "general quality of life" as well as those who had a poor "health status" were less likely to use healthcare services. However, this is the group which is particularly addressed by health interventions with the aim to improve their quality of life [48].

Considering patient subgroups, ethnic minorities seemed to have several unique barriers: e.g. "language", "cultural beliefs", "religious beliefs", and "social beliefs". It is important to consider these special barriers in healthcare access because members of ethnic-minority populations often have a higher prevalence of T2DM [49]. Harris et al. showed that non-Hispanic Black women and Mexican–American men are less likely to have good glycaemic control compared to White individuals with T2DM [50]. In contrast, Karter et al. suggested that after adjusting for demographic, socioeconomic, behavioural and clinical factors most complications were equally prevalent among different ethnic groups [51]. Therefore, ethnic disparities have to be interpreted with caution because they might be caused by confounding factors, in particular socioeconomic status [51]. While our results suggest that individuals of Muslim faith are less likely to care for their health due to a fatalistic acceptance of DM as God's will [35,36], Greenhalgh et al. described that British Bangladeshi Muslims were engaged in information seeking and dietary change as they thought it was their responsibility to care for the treatment of DM despite regarding the disease as predetermined by God [52]. Other studies also suggest that Iranian Muslims are more likely to care for their body because they perceive it as God's gift [53].

4.1. *Limitations of our study*

Our rigorous inclusion criteria resulted in a small number of included papers. We only included studies dealing with healthcare use in terms of realised access and excluded studies dealing, for example, with insulin therapy, where systematic reviews exist [8,9]. We decided to use these strict criteria to have clear-cut results.

5. Conclusion

We identified a broad range of psychosocial barriers to healthcare use among individuals with DM. Our review provides an insight into barriers to healthcare use that to a point might explain the often unsatisfactory glycaemic control in individuals with DM. Frequently reported barriers to healthcare use are, for example, "socioeconomic status" containing financial barriers, and "physician characteristics" containing communication barriers. The observations in our systematic review enable a more detailed understanding of the healthcare processes and structures that might be addressed in order to improve care for people with DM. Regarding the low number of available studies, research is needed to investigate barriers to healthcare use with regard to participant characteristics, taking language and culture of ethnic minorities into consideration.

Conflict of interest

The authors declare that they have no competing interests.

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Ethics approval

Not applicable

Consent for publication

Not applicable.

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Appendix A.

See Table A1.

Table A1 – Search strategy.

Database	Step	Hits	Search terms
MEDLINE (OVID)	1	63,621	*DIABETES MELLITUS/
	2	141,660	EXP DIABETES MELLITUS, TYPE 1/ OR EXP DIABETES MELLITUS, TYPE 2/
	3	7549	EXP DIABETES, GESTATIONAL/
	4	598,589	(diabetes OR diabetic OR insulin OR t1dm OR t2dm).ti,ab.
	5	621,173	1 OR 2 OR 3 OR 4
	6	4933	EXP COMMUNICATION BARRIERS/
	7	10,765	EXP TREATMENT REFUSAL/
	8	534	EXP REFUSAL TO PARTICIPATE/
	9	233,829	(non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*).ti,ab.
	10	16,182	6 OR 7 OR 8
	11	42,292	(non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*).ti.
	12	116,862	EXP CULTURE/
	13	324,385	EXP ATTITUDE TO HEALTH/ OR *ATTITUDE/
	14	18,305	EXP SOCIAL VALUES/
	15	8976	EXP SOCIAL CONDITIONS/
	16	349,690	EXP SOCIOECONOMIC FACTORS/
	17	16,496	EXP “PATIENT ACCEPTANCE OF HEALTH CARE”/PX
	18	59,178	EXP PSYCHOLOGY/
	19	5767	EXP SELF CARE/PX
	20	31,613	EXP POVERTY/
	21	33,087	EXP SOCIAL CLASS/
	22	10,039	EXP SOCIAL JUSTICE/
	23	69,952	*“HEALTH CARE QUALITY, ACCESS, AND EVALUATION”/ OR *HEALTH SERVICES RESEARCH/ OR *QUALITY ASSURANCE, HEALTH CARE/ OR *“QUALITY OF HEALTH CARE”/
	24	9	EXP HEALTH SERVICES FOR PERSONS WITH DISABILITIES/
	25	8385	EXP HEALTHCARE DISPARITIES/
	26	86,305	EXP HEALTH SERVICES ACCESSIBILITY/
	27	49	EXP CULTURALLY COMPETENT CARE/
	28	630	*“DELIVERY OF HEALTH CARE”/UT
	29	18,630	EXP PATIENT PARTICIPATION/
	30	3571	EXP PATIENT PREFERENCE/
	31	22,512	(patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient’ preference* OR equality OR fairness OR justice OR perceptions).ti,ab.
	32	317,374	12 OR 14 OR 15 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 24 OR 25 OR 27 OR 28 OR 29 OR 30 OR 31
	33	101	5 AND 10 AND 32
	34	919,207	12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31

Table A1 (*Continued*)

Database	Step	Hits	Search terms
	35	327	5 AND 11 AND 34
	36	5999	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)).ti,ab.
	37	312	5 AND 36
	38	9543	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (psychology OR preference* OR perception* OR family OR relatives OR friends OR peers OR group* OR self-motivation OR self-efficacy OR motivation* OR emotion* OR worries OR worry* OR shame OR attitude* OR prejudice OR discriminat* OR inappropriate* OR unsatisfact* OR unsupport* OR non-support* OR pressure OR feeling*)).ti,ab.
	39	364	5 AND 38
	40	2497	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj2 (lack OR lacks OR low OR negative OR insufficient OR "not enough" OR wrong)).ti,ab.
	41	49	5 AND 40
	42	960	33 OR 35 OR 37 OR 39 OR 41
PubMed (NLM)	#1	71,722	("HEALTH SERVICES/COMPLICATIONS"[MESH] OR "HEALTH SERVICES/ETHICS"[MESH] OR "HEALTH SERVICES/ETHNOLOGY"[MESH] OR "HEALTH SERVICES/THERAPEUTIC USE"[MESH] OR "HEALTH SERVICES/UTILIZATION"[MESH])
	#2	231,952	((((""DIABETES MELLITUS""[MESH:NOEXP]) OR ""DIABETES MELLITUS, TYPE 1""[MESH]) OR ""DIABETES MELLITUS, TYPE 2""[MESH]) OR ""DIABETES, GESTATIONAL""[MESH])"
	#3	601,724	diabetes[tiab] OR diabetic[tiab] OR insulin[tiab] OR t1dm[tiab] OR t2dm[tiab]"
	#4	1691	#1 AND (#2 OR #3)
	#5	237,203	non-compliance[tiab] OR non-adherence[tiab] OR barrier[tiab] OR barriers[tiab] OR obstacle[tiab] OR obstacles[tiab] OR refusal[tiab] OR hindrance[tiab] OR non-participation[tiab] OR non-uptake[tiab] OR facilitator*[tiab]
	#6	83	#4 AND #5
	#7	45	#6 AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)
	#8	143,864	"UTILIZATION" [SUBHEADING]
	#9	152	#8 AND (#2 OR #3) AND #5
	#10	76	#9 AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)
	#11	78	#7 OR #10
	#12	1	25485333 [pmid]
	#13	101	Similar articles for PubMed (Select 25485333)
	#14	1	Diet AND physical activity in the self-management of type 2 diabetes: barriers AND facilitators identified by patients AND health professionals
	#15	269	Similar articles for PubMed (Select 23739524)
	#16	176	#15 AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)
	#17	1	Understanding barriers to glycaemic control from the patient's perspective
	#18	106	Similar articles for PubMed (Select 23748392)
	#19	66	#18 AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)
	#20	1	Fear, guilt feelings AND misconceptions: barriers to effective insulin treatment in type 2 diabetes
	#21	99	Similar articles for PubMed (Select 21864760)
	#22	57	#21 AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)
	#23	1	21382643[pmid]
	#24	143	Similar articles for PubMed (Select 21382643)
	#25	96	#24 AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)

Table A1 (*Continued*)

Database	Step	Hits	Search terms
	#26	1	Beliefs, barriers, social support, AND environmental influences related to diabetes risk behaviours among women with a history of gestational diabetes
	#27	137	Similar articles for PubMed (Select 20701563)
	#28	102	#27 AND (diabetes[tiab] OR diabetic[tiab] OR insulin[tiab] OR t1dm[tiab] OR t2dm[tiab])
	#29	587	#11 OR #13 OR #16 OR #19 OR #22 OR #25 OR #28
EMBASE (OVID)	1	190,092	*DIABETES MELLITUS/
	2	219,267	EXP DIABETES MELLITUS, TYPE 1/ OR EXP DIABETES MELLITUS, TYPE 2/
	3	21,835	EXP DIABETES, GESTATIONAL/
	4	807,470	(diabetes OR diabetic OR insulin OR t1dm OR t2dm).ti,ab.
	5	861,609	1 OR 2 OR 3 OR 4
	6	52,551	EXP COMMUNICATION BARRIERS/
	7	13,026	EXP TREATMENT REFUSAL/
	8	872	EXP REFUSAL TO PARTICIPATE/
	9	66,341	6 OR 7 OR 8
	10	50,155	(non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*).ti.
	11	47,856	EXP CULTURE/
	12	106,173	EXP ATTITUDE TO HEALTH/ OR *ATTITUDE/
	13	84,109	EXP SOCIAL VALUES/
	14	120,278	EXP SOCIAL CONDITIONS/
	15	189,901	EXP SOCIOECONOMIC FACTORS/
	16	181,970	EXP PSYCHOLOGY/
	17	32,306	EXP POVERTY/
	18	26,995	EXP SOCIAL CLASS/
	19	7987	EXP SOCIAL JUSTICE/
	20	71,690	*“HEALTH CARE QUALITY, ACCESS, AND EVALUATION”/ OR *HEALTH SERVICES RESEARCH/ OR *QUALITY ASSURANCE, HEALTH CARE/ OR *“QUALITY OF HEALTH CARE”/
	21	7286	EXP HEALTHCARE DISPARITIES/
	22	3311	EXP CULTURALLY COMPETENT CARE/
	23	18,262	EXP PATIENT PARTICIPATION/
	24	6831	EXP PATIENT PREFERENCE/
	25	28,219	(patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient’ preference* OR equality OR fairness OR justice OR perceptions).ti,ab.
	26	1381	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (psychology OR preference* OR perception* OR family OR relatives OR friends OR peers OR group* OR self-motivation OR self-efficacy OR motivation* OR emotion* OR worries OR worry* OR shame OR attitude* OR prejudice OR discriminat* OR inappropriate* OR unsatisfact* OR unsupport* OR non-support* OR pressure OR feeling*)).ti.
	27	67	5 AND 26
	28	816	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)).ti.
	29	42	5 AND 28
	30	390,899	11 OR 13 OR 14 OR 16 OR 17 OR 18 OR 19 OR 21 OR 22 OR 23 OR 24 OR 25
	31	61	5 AND 9 AND 30
	32	651,624	11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25
	33	237	5 AND 10 AND 32
	34	289	31 OR 33
	35	361	27 OR 29 OR 34
	36	220	limit 35 to embase
PsycINFO (OVID)	1	3709	*DIABETES MELLITUS/
	2	0	EXP DIABETES MELLITUS, TYPE 1/ OR EXP DIABETES MELLITUS, TYPE 2/
	3	0	EXP DIABETES, GESTATIONAL/
	4	25,822	(diabetes OR diabetic OR insulin OR t1dm OR t2dm).ti,ab.
	5	25,861	1 OR 2 OR 3 OR 4
	6	412	EXP COMMUNICATION BARRIERS/
	7	651	EXP TREATMENT REFUSAL/
	8	0	EXP REFUSAL TO PARTICIPATE/
	9	1063	6 OR 7 OR 8

Table A1 (*Continued*)

Database	Step	Hits	Search terms
	10	10,424	(non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*).ti.
	11	0	EXP CULTURE/
	12	0	EXP ATTITUDE TO HEALTH/ OR *ATTITUDE/
	13	4027	EXP SOCIAL VALUES/
	14	0	EXP SOCIAL CONDITIONS/
	15	0	EXP SOCIOECONOMIC FACTORS/
	16	141,265	EXP PSYCHOLOGY/
	17	6675	EXP POVERTY/
	18	8446	EXP SOCIAL CLASS/
	19	4166	EXP SOCIAL JUSTICE/
	20	0	*"HEALTH CARE QUALITY, ACCESS, AND EVALUATION"/ OR *HEALTH SERVICES RESEARCH/ OR *QUALITY ASSURANCE, HEALTH CARE/ OR *"QUALITY OF HEALTH CARE"/
	21	0	EXP HEALTHCARE DISPARITIES/
	22	0	EXP CULTURALLY COMPETENT CARE/
	23	1467	EXP PATIENT PARTICIPATION/
	24	0	EXP PATIENT PREFERENCE/
	25	38,029	(patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR equality OR fairness OR justice OR perceptions).ti,ab.
	26	938	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (psychology OR preference* OR perception* OR family OR relatives OR friends OR peers OR group* OR self-motivation OR self-efficacy OR motivation* OR emotion* OR worries OR worry* OR shame OR attitude* OR prejudice OR discriminat* OR inappropriate* OR unsatisfact* OR unsupport* OR non-support* OR pressure OR feeling*)).ti.
	27	15	5 AND 26
	28	699	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)).ti.
	29	12	5 AND 28
	30	196,753	11 OR 13 OR 14 OR 16 OR 17 OR 18 OR 19 OR 21 OR 22 OR 23 OR 24 OR 25
	31	0	5 AND 9 AND 30
	32	196,753	11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25
	33	7	5 AND 10 AND 32
	34	7	31 OR 33
	35	33	27 OR 29 OR 34
	36	7067	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (psychology OR preference* OR perception* OR family OR relatives OR friends OR peers OR group* OR self-motivation OR self-efficacy OR motivation* OR emotion* OR worries OR worry* OR shame OR attitude* OR prejudice OR discriminat* OR inappropriate* OR unsatisfact* OR unsupport* OR non-support* OR pressure OR feeling*)).ti,ab.
	37	133	5 AND 36
	38	5653	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)).ti,ab.
	39	116	5 AND 38
	40	232	35 OR 37 OR 39
CINAHL (EBSCO)	S1	64,335	MH diabetes mellitus OR TI (diabetes OR diabetic)
	S2	10,229	MH barriers to healthcare OR TI ((barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*))
	S3	17,999	TI ((patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR equality OR fairness OR justice OR perceptions)) OR AB ((patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR equality OR fairness OR justice OR perceptions))

Table A1 (*Continued*)

Database	Step	Hits	Search terms
	S4	228,812	TI ((social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)) OR AB ((social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability))
	S5	80	(S3 OR S4) AND S1 AND S2
ERIC (Institute of Education Sciences)	1	53	(diabetes OR diabetic) AND (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability OR patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR perceptions) AND (barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*)
Sowiport (GESIS)	1	43	(Title: diabetes OR diabetic AND Title: barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator* AND All fields: social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability OR patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR perceptions)

Database	Step	Hits	Request
The Cochrane Library (Wiley)	#1	16,751	MeSH descriptor: [DIABETES MELLITUS] explode all trees
	#2	23,154	(diabetes OR diabetic):ti
	#3	26,833	#1 OR #2
	#4	1380	(barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*):ti
	#5	100,001	(social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability OR patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR perceptions):ti,ab
	#6	13	#3 AND #4 AND #5

Database	Step	Hits	Search terms
Web of Science (Thomson Reuters)	# 1	262	TI = (diabetes OR diabetic) AND TI = (barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) AND TS = (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability OR patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR perceptions) Timespan = all years Search language = auto
MedPilot, (ZBMed)	1	17	Title: diabetes AND Title: social barriers
	2	11	Title: diabetes AND Title: psychological barriers
	3	32	Title: diabetes AND Title: obstacles
	4	5	Title: diabetes AND Title: hindrance
	5	60	1 OR 2 OR 3 OR 4
Journals@Ovid (OVID)	1	206,590	(diabetes OR diabetic OR insulin OR t1dm OR t2dm).ti,ab.
	2	15,946	(non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*).ti.
	3	11,425	(patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR equality OR fairness OR justice OR perceptions).ti,ab.
	4	723	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (psychology OR preference* OR perception* OR family OR relatives OR friends OR peers OR group* OR self-motivation OR self-efficacy OR motivation* OR emotion* OR worries OR worry* OR shame OR attitude* OR prejudice OR discriminat* OR inappropriate* OR unsatisfact* OR unsupport* OR non-support* OR pressure OR feeling*)).ti.

Table A1 (*Continued*)

Database	Step	Hits	Search terms
	5	38	1 AND 4
	6	404	((non-compliance OR non-adherence OR barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*) adj5 (social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability)).ti.
	7	21	1 AND 6
	8	6	1 AND 2 AND 3
	9	61	5 OR 7 OR 8
Science Direct (Elsevier)	1	143	TITLE((diabetes OR diabetic)) AND TITLE((barrier OR barriers OR obstacle OR obstacles OR refusal OR hindrance OR non-participation OR non-uptake OR facilitator*)) AND TITLE((social OR cultural OR sociocultural OR socio-cultural OR socioeconomic* OR psychosocial OR psychological* OR fear OR anxiety OR literacy OR justice OR equality OR fairness OR ethnic* OR vulnerable OR vulnerability OR patient* beliefs OR health beliefs OR illness beliefs OR patient* value* OR patient' preference* OR perceptions))
Deutsches Ärzteblatt (Deutscher Ärzteverlag)	1	6	“psychosoziale” & “barrieren” & “diabetes”
Database	Step	Hits[a]	Search terms
Karlsruher virtueller Katalog (KvK)(Karlsruher Institut für Technologie)	1	1	(diabetes) AND (barriers OR obstacles OR refusal OR hindrance OR facilitator*)

[a] After screening.

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