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Latent classes of learners in people with type 2 diabetes, stratified by educational status: A cross-sectional study

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ABSTRACT

Objective: Research suggests that people with type 2 diabetes (PWT2D) exhibit different approaches to learning about disease-management. This study's aims to identify distinct learner groups among PWT2D and stratify them by educational status (ES).
Methods: Cross-sectional data from 227 PWT2D, collected through 46 Likert-scale questions on learning behaviors, preferences, and attitudes, were analyzed using latent class analysis, to identify learner groups. Participants were recruited via healthcare practices in central Germany and a countrywide online survey. Group membership was displayed according to low, medium, and high ES, defined by years of schooling.
Results: Four learner groups were identified: casual, versatile, insecure, and theorist learners. Insecure learners accounted for almost half of all respondents in the low ES group (46 %), casual learners were most prevalent among PWT2D with a medium (27 %), versatile (34 %) and theorist (29 %) learners among those with a high ES.
Conclusion: This study sheds light on learner groups among PWT2D, which differ by ES, suggesting social disparities in diabetes care. Further research is needed to validate these findings.
Practice Implications: Understanding individual learning preferences and motivations is crucial for developing effective diabetes self-management trainings, which may involve providing additional background material for theorists and practical applications for insecure learners.

1. Introduction

Type 2 diabetes is a complex disease to manage. People with type 2 diabetes (PWT2D) must make frequent daily decisions concerning diet, exercise, and blood glucose monitoring. Regular checking of symptoms and different health care services are necessary to avoid two types of complications: macrovascular complications (e.g., coronary heart disease and strokes) and microvascular complications (e.g., neuropathy, nephropathy, and retinopathy). Microvascular complications might lead to lower limb amputation, kidney failure, or blindness [1].

Diabetes self-management education (DSME) has proven effective in preventing such complications. Diabetes training positively impacts blood glucose levels and hemoglobin A1C [2,3], increases diabetes-related knowledge [4], reduces diabetes-related distress [5,6] and lowers blood pressure as well as body weight [7,8]. These positive outcomes are of course indirect effects, presumably mediated by

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behavioral changes that result from what has been learned in DSME. This indicates that expert guidance provided in diabetes education, and diabetes health care in general, is crucial for PWT2D to learn to live with their disease.

Yet, expert guidance can only be effective if health care professionals understand their patients and their individual needs [9,10]. Contrarily, treating patients merely as a set of modifiable behaviors runs the risk of causing conflict and disconnect between patients and health care professionals. This could, e.g., result in underutilization of DSME, as 30–50 % of eligible PWT2D do not even attend DSME, despite full cost coverage by the German compulsory health insurance [11]. Health care professionals might be experts of the disease, but only PWT2D know best about their own lives and how to best integrate disease management into their everyday routines [10]. If healthcare providers' advice and recommendations, such as the participation in diabetes training, are not followed because they are not adjusted to the individual patient's life situation, this presents barriers to effective health care [10,12].

In order to successfully integrate disease-management into patients' everyday lives, learning processes are necessary [13–15]. These learning processes are approached and shaped differently by individual PWT2D, leading to varying forms of diabetes self-management, depending on whether PWT2D are more inclined to focus on acquiring everyday coping strategies or gaining holistic knowledge about their disease and its implications on a more abstract level. [13,16,17].

Considering this idiosyncrasy of individual learning approaches, in addition to the complexity of life-long diabetes management, it is unreasonable to expect PWT2D to adhere to predetermined, inflexible care programs [10]. The best approach might thus be to tailor diabetes education to individual PWT2D.

Although the merit of this approach has been shown [18–20], its scalability suffers from the complexity of implementation. As a more pragmatic approach it has been suggested to first identify groups of learners among PWT2D with similar needs and behaviors and then design diabetes education with these groups in mind [13,21,22].

It seems reasonable to assume that socioeconomic status plays an important role in the manifestation of such learner groups. Socioeconomic status not only influences glycemic control and the occurrence of disease-related complications and mortality among PWT2D [23,24], but also play a role in PWT2D's likelihood of participating in DSME, their information needs and how they shape learning processes [16,22,25].

This study explores different groups of learners among PWT2D with the help of latent class analysis, a statistical method used "to recover hidden groups from observed data" [26], stratified by an important aspect of socioeconomic status, educational status. The goal is to answer two main questions:

1) Which classes of learners can be found in people with type 2 diabetes?
2) How are these classes stratified by educational status?

2. Methods

The present study's methods were adopted from a study on learning types among German adults conducted by Josef Schrader [27]. This approach was chosen because it is the most diligently constructed empirical investigation of learning preferences and aversions in adult Germans and its methods are described in great detail. A description of the methodological procedure will be given after outlining the process of data collection.

2.1. Survey

Study participants were recruited with the help of healthcare professionals in general medical and specialized diabetes practices in central Germany (Saxony, Saxony-Anhalt, and Thuringia).

After agreeing to support the study, respective healthcare practices received questionnaires to hand out to patients. The practice nurses identified potential study participants, informed them about the study and handed them the questionnaire. After completion, the questionnaires were sent to the study center at the Medical Faculty of Martin Luther University of Halle-Wittenberg.

To take part in the study, prospective participants had to be at least 18 years old, had to have received a diagnosis of type 2 diabetes, and had to be able to read and understand German. The recruitment process was shaped by difficulties resulting from the COVID-19 pandemic. For one, the pandemic interfered with the implementation of DSME during the period of recruitment. Because diabetes training was used by many practice nurses for study recruitment, the repeated suspension of such training left gaps in the recruitment process. Additionally, pressures from the pandemic resulted in the deprioritization of study support in the practices. To expand the number of participants and the reach of the study, an additional online survey was implemented. Any German speaking person living in Germany with type 2 diabetes over the age of 18 could participate in the online survey.

2.2. Questionnaire and variables

2.2.1. Learning behaviors, preferences, and attitudes

The questions used to survey learning behavior, preferences, and attitudes, were adopted from Schrader's study on learning types among adults [27]. A total of 46 Likert-scale questions were used to investigate learning processes. This large set of questions aimed at illuminating a wide variety of dimensions in the individual approaches to learning. Main themes included preferences in regards to the media used for learning (e.g., text, video, presentations, etc.), framework conditions of the learning situation (e.g., group or guided learning vs. solitary learning), and the complexity of learning material. Furthermore, general attitudes toward learning were surveyed (e.g., learning as intrinsically rewarding vs. bothersome), as well as approaches and methods taken in situations of learning (e.g., usage of learning techniques and exercises, focusing on learning facts vs. focusing on more abstract connections, etc.), degrees of confidence in learning processes, and individual responses to difficulties (e.g., responding with self-doubt vs. ambition). A detailed description of the questions concerning learning behavior, preferences, and attitudes can be found in the work from which they were adopted [27].

2.2.2. Educational status (ES)

Study participants' educational status was chosen as a determinant of socioeconomic status, as it primarily represents knowledge and intangible resources, which are relevant factors in the context of learning in general education and DSME in particular. ES was operationalized in three categories: low, medium, and high, depending on their school degree in the German education system [28]. Participants with a degree that could be completed in nine years of schooling or with no degree at all were categorized as low ES. Medium ES was defined as having a school degree that required ten years of schooling. High ES was defined as having a degree that required at least 12 years of schooling.

2.3. Statistical analysis

The statistical analyses were conducted reproducing Schrader's methods for the investigation of learning types in German adults [27]. This procedure consisted of three main steps. 1) Collapsing the multitude of questionnaire items into factors with shared underlying themes. 2) Remodeling these factors into binary variables. 3) Using the binary variables as basis for latent class analysis to identify classes of learners.

2.3.1. Collapsing questionnaire items into factors

Confirmatory factor analysis [29] was used with the aim to test Schrader's factor structure [27]. Items from two of Schrader's 18 factors were excluded because they did not fit the context of diabetes education

(revolving around exams and external rewards, such as promotions). Another eight factors were not included in data analysis, either because the underlying construct scored less than .6 when tested with Cronbach's alpha or because confirmatory factor analysis did not converge for that set of items. This left eight factors for data analysis, which were remodeled into binary variables.

In contrast to traditional education, DSME delivers complex medical concepts that needs to be applied to personal situations, such as precise medication or dietary plans, directly affecting PWT2D's health. Difficulties with abstraction and concentration can impede this process and must be specifically addressed to enable the success of DSME. Similarly, it is crucial to understand how individuals react to difficulties, that almost all PWT2D will experience at some point in their patient journey, to respond appropriately. This may involve providing additional emotional support for those experiencing uncertainty and doubt or channeling intrinsic motivation to sustain this motivation in the long-term. Therefore, we proceeded with the remaining eight factors, as they are addressing the specific demands of DSME, covering learning preferences (four factors) as well as confidence and individual responses within the learning process (four factors).

2.3.2. Remodeling factors into binary variables

Eight factor-based binary variables were created to indicate whether the underlying theme of a particular factor (e.g., "self-doubting when challenged") was true above average for a particular study participant when compared with the total sample. Remodeling factors into binary variables took place in five steps. 1) Responses to each item were given values according to their position on the Likert scale (e.g., "totally agree" = 1, "rather agree" = 2, "rather disagree" = 3, "totally disagree" = 4). 2) For each participant and each item, the item's factor loading was multiplied by its response value. 3) The multiplication products from all items in a factor were added and then divided by the number of items in that factor. The resulting value could be used to compare the relevance of underlying factor themes between participants. The lower the value, the more relevant the underlying theme was for that particular participant. 4) For each factor, the median value was calculated. 5) Finally, these medians were used to create binary variables, distinguishing the participants below median from the rest [30]. Performing these median splits allowed for the surveying of a broad spectrum of dimensions in learning processes, while at the same time relying only on the most important and condensed dimensions or aspects of the learning process as predictors for different classes of learners, minimizing noise from less relevant dimensions.

2.3.3. Identifying latent classes of learners

To identify the classes of learners among PWT2D, latent class analysis was applied. Latent class analysis is a binomial finite mixture model method that identifies discrete latent classes with the help of binary response variables [26,31,32]. To run latent class analysis, the LCA Stata plugin from Pennsylvania State University [33] was used with Stata 15. Different latent class models were calculated with class numbers ranging from one to six. The optimal number of classes was chosen with the help of goodness-of-fit statistics and by comparing interpretability of class structures between different models [32,34]. As fit statistics, Akaike Information Criterion (AIC), Consistent Akaike Information Criterion (CAIC), Bayes Information Criterion (BIC), and sample-size adjusted BIC (SABIC), all of which are likelihood-based, were considered. Lower values indicate better fit for each of these statistics. A more detailed description of these fit statistics can be found elsewhere [32,35].

To explore how distribution of latent classes differ by educational background, the prevalence of classes was stratified by educational status. For this end, ES was included as a categorical variable with the "groups" option in the LCA stata plugin syntax [33]. Additional models were computed to examine the association of different covariates with class membership. The covariates jointly included into the models covered age, sex, mode of survey participation (online vs. pen & paper) and time since diagnosis (less than four months prior to survey participation vs. more than four months), as regular diabetes follow-up training is advised to evaluate self-management at periodic intervals and adjust therapy if necessary [8]. By including the time since diagnosis, we also aimed to address possible differences between certain kinds of individuals. We assumed that PWT2D with a proactive learning type might also be more likely to seek help or adopt self-management strategies shortly after their diagnosis, while others may take longer to engage in these.

3. Results

3.1. Sample characteristics

Descriptive statistics of the study's sample can be found in Table 1. In total, 280 valid questionnaires were filled out by PWT2D. Study participants were given different questionnaires, of which 31 could not be used for the current data analysis because they did not survey learning preferences and behavior. The data of 22 additional participants were excluded because of missing information on educational background. This left a sample of 227 cases for the current analysis.

This sample consisted of more men than women (56.3 % vs. 42.7 %), one missing indication of sex, and one non-binary person. Most study participants had a medium ES (45.4 %), followed by high ES (33.5 %), and low ES (21.2 %). Mean age at time of participation was 59.5 years, with a range of 29 to 86 years. Most participants had been diagnosed with type 2 diabetes more than four months ago (57.3 % vs. 42.7 % less than four months ago) and participated in the study online (56.8 %) compared to 43.2 % who participated with pen & paper.

3.2. Latent classes of learning approaches

Different models with latent class numbers ranging from one to six were calculated. Table 2 shows the goodness-of-fit statistics for the different latent class models. Fit statistics are split evenly in preference of the 2-class-solution (BIC and CAIC) and the 4-class-solution (AIC and SABIC). For reasons of interpretability and because of stronger consistency with the results of Schrader's research on latent classes of learners among adults, the 4-class-solution was chosen as the most appropriate model [27].

The following four classes were found among PWT2D:

1st class – casual learners. Respondents in the first class of learners (n = 53) are neither overly ambitious when faced with challenges nor do they respond with self-doubt in such situations. Hence, they were named *casual* learners. Casual learners have an average need for applicability in the learning process. They are not characterized by difficulties with

Table 1
Descriptive sample statistics (n = 227).

Sociodemographic and disease-related factor	Frequency or Mean (%)
Sex	
Female	97 (42.7 %)
Male	128 (56.3 %)
Other	1 (0.4 %)
Missing	1 (0.4 %)
Age	
Mean	59.5 (SD: 10.0)
Range	29 - 86
Educational status	
Low	48 (21.2 %)
Medium	103 (45.4 %)
High	76 (33.5 %)
Time since diagnosis of type 2 diabetes	
≤ 4 months	97 (42.7 %)
> 4 months	130 (57.3 %)
Survey type	
Pen & Paper	98 (43.2 %)
Online	129 (56.8 %)

Table 2
Goodness-of-fit statistics for the six different models of latent class analysis.

Models	LL	AIC	BIC	CAIC	SABIC
1 Class	−1185.6474	676,69918	704,09878	712,09878	678,74453
2 Class	−1118.2179	563,84015	**628,9142**	**647,91420**	568,69785
3 Class	−1097.9072	545,21882	647,96732	677,96732	552,88887
4 Class	−1082.4601	**536,3246**	676,74755	717,74755	**546,80699**
5 Class	−1072.0009	537,40626	715,50366	767,50366	550,70101
6 Class	−1062.6138	540,63207	756,40392	819,40392	556,73916

Bold indicates best fit for the respective statistic (lower values indicate better fit for all given fit statistics). LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; CAIC = consistent Akaike information criterion; SABIC = sample-size adjusted Bayesian information criterion.

concentration. When it comes to learning methods, casual learners learn best by doing or talking with others.

2nd class – versatile learners. *Versatile* learners (n = 66) were given their name because they are above average in all learning methods. When it comes to concentrating, though, they have difficulties. They are very close to average in their need for applicability and strong reasons for the learning process, just as in their aversion towards theory and abstraction. When facing challenges, versatile learners responded slightly less likely than average with ambition and marginally above average with self-doubt.

3rd class – insecure learners. *Insecure* learners (n = 61) show the most extreme response probabilities of all classes for almost all items. They have the highest need for applicability and strong reasons in the learning process; they are less-than-average successful with all learning methods; they show the highest degrees of difficulties with concentration and abstraction; and they respond to challenges with less ambition and more self-doubt than any other class.

4th class – theorist learners. *Theorist* learners (n = 47) have little need for applicability and have no difficulties with abstraction or concentration. They are more successful with presentations, films, and audio than all other classes. They are average in regard to learning by reading or with the help of explanations and below average in regard to learning by doing or talking with others. Theorist learners show the highest degree of ambition among all classes when faced with challenges and the lowest degree of self-doubt.

Item response probabilities for all four latent classes can be found in Fig. 1. A side-to-side comparison of classes found in the present research with their counterparts of adult learners in Schrader's sample [27] is given as supplementary material, showing a solid match between the group of application-driven learners (Schrader) and the group of casual learners (present study), as well as between the strategic (Schrader) and versatile (present study) learner group. Moreover, a very good match can be found for the respective groups of insecure and theorist learners in both studies.

Fig. 2 shows the stratification of classes of learners by ES. Among the PWT2D with the highest ES, versatile learners are most prominent, followed by theorist learners. For those with medium ES, theorist learners are least prevalent, while the remaining three classes are distributed very evenly (26–29 %). Among those with a low ES, the most prominent class is that of the insecure learners with a prevalence of 46 %. None of the covariates (age, sex, mode of survey participation, and time of diagnosis) were significantly associated with latent class membership.

4. Discussion and conclusion

4.1. Discussion

This is the first study to analyze multifaceted learner classes in PWT2D, expanding the narrower models of learning styles that lack empirical evidence of practical use [36–38]. Latent class analysis has identified four classes of learners with differing distributions in regards to ES. Casual learners are especially prominent among people with a medium ES. Versatile and theorist learners are dominant among those with a high ES. Insecure learners are most prevalent in the lower ES group, accounting for almost half of all respondents in this group.

People with a lower socioeconomic status, measured by educational status, occupational position an income, are generally at a higher risk of being diagnosed with type 2 diabetes [39]. In high income countries, the educational gradient in diabetes prevalence even tends to increase [40, 41]. Regarding chronic disease self-management in general, people with a lower socioeconomic status show lower degrees of self-efficacy, a tendency toward passivity when it comes to managing their conditions [16,44] and also receive lower quality health care [42,43]. These tendencies, in turn, lead to minor disease-related knowledge and sub-optimal lifestyle decisions in terms of diet and exercise [45,46] as well as a higher frequency of negative outcomes such as retinopathy or

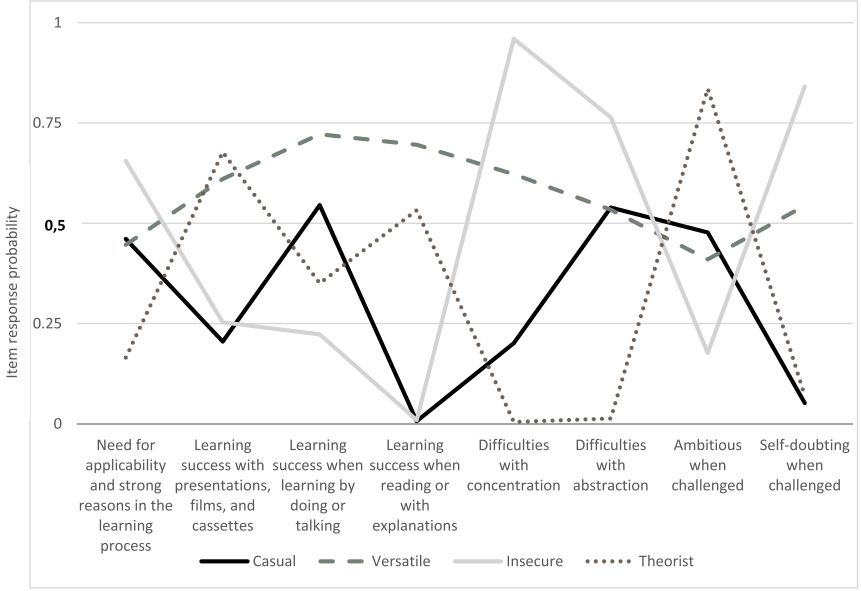

Fig. 1. Item response probabilities in latent classes of learners among people with type 2 diabetes (n = 227). Values above .5 indicate that the given item is meaningful or true above average and values below .5 indicate that it is below average.

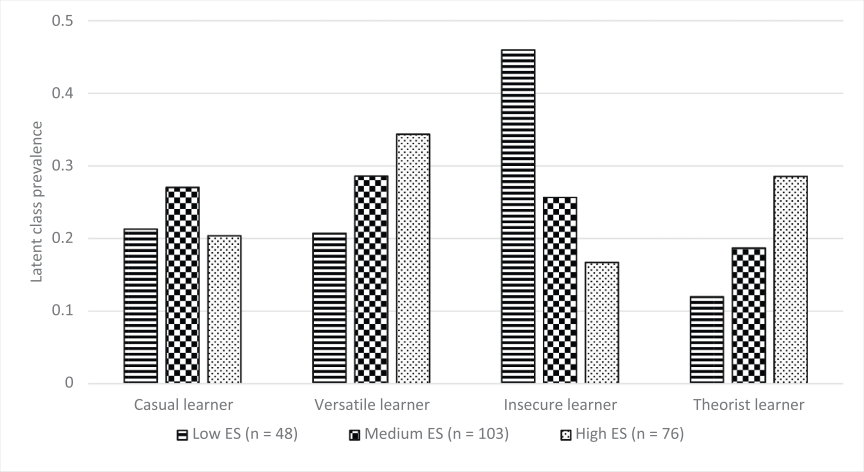

Fig. 2. Latent class prevalence for all four classes of learners stratified by educational status (ES).

nephropathy for PWT2D [23]. The high prevalence of insecure learners among PWT2D with lower ES might help explain the tendency toward passivity and the low degree of self-efficacy among people with a low ES.

Addressing groups with similar characteristics presents an alternative to tailoring health care services to individual PWT2D, which has shown to have benefits but is unlikely to be feasible in practice on a large scale due to a wide array of needs in individuals [18–20]. Since it is crucial for DSME and diabetes care to be adapted to PWT2D's specific behaviors and needs, targeting homogeneous subgroups of PWT2D can serve to combine adaptability and feasibility [16,21,22,47,48].

Preferred methods of learning also distinguish the classes of learners. Only versatile learners feel comfortable with all given learning methods. Knowledge about preferred learning methods does not suggest, though, confronting learners only with methods they are comfortable with. Research has not verified the benefits of matching learning styles with complementary teaching styles [36–38]. Nonetheless, knowledge about preferred learning methods might reduce friction in the learning process by creating awareness of methods that are less popular with some learner classes. This seems especially true in the extreme case of the insecure learners who do not agree with any of the learning methods. Additionally, insecure learners respond to challenges with little ambition but with high degrees of self-doubt.

For this class of learners, it seems reasonable to focus on empowerment strategies that help build self-confidence and facilitate taking an active role in the process of learning about diabetes self-management. PWT2D who actively take responsibility for their own diabetes care achieve better blood glucose control and show higher degrees of self-reliance. This in turn makes them less dependent on health care professionals and more successful in integrating their illness into a self-determined life [14,49–53]. Different tools have been developed to empower patients to take a more active role in disease-management, focusing on goal-setting, strategy development for goal attainment, and progress monitoring [10,54,55]. These tools might prove especially useful with insecure learners.

Although the present study has taken first steps toward the accumulation of such knowledge, some limitations of the study must be mentioned. The study team had no direct control over participant selection. Instead, the practice nurses identified and enrolled participants. This made it hard for the study team to have a good grasp of the actual recruitment process and its randomness. As a result, the sample size was smaller than planned, and is potentially subject to a selection bias, which is suggested by the difference between the ES of the study participants and the general population. This might affect the results of the statistical analysis, by limiting its inferential power. In latent class analysis, this small sample size might have resulted in the underestimation of the number of classes [35]. Thus, the confirmatory factor analysis could not confirm all factors from the original research this study is based on [27], which in turn might have led to less dimensions to describe the classes of learners than was initially planned. An online version of the questionnaire was introduced to bolster sample size, with moderate success. The downside of introducing the online questionnaire was the high likelihood of adding to the selection bias. As mentioned, the small fraction of PWT2D with a low ES does not reflect the actual socio-economic realities in Germany. Additional research is needed to further investigate the distribution of ES among learner classes, beyond the scope of this study's sample. Further difficulties arose due to the COVID-19 pandemic, which made it impossible to enroll participants for long stretches of time during the recruitment period.

4.2. Conclusion

With the help of latent class analysis, this study identified four classes of learners among PWT2D: Casual, versatile, insecure, and theorist learners. The distribution of learner classes varied substantially by ES. With the exception of the casual learners, membership prevalence for the different learner classes along ES shows a clear gradient, either in line with the order of ES (versatile and theorist learners) or in reverse order (insecure learners).

Overall, this study should not be interpreted as a conclusive description of learner classes among PWT2D. Instead, it should be recognized as a first multifaceted exploration of classes of learners among PWT2D. The discussion has given some examples of practical implementation based on the results of this study. Due to the study's non-representative sample, these examples should not be regarded as conclusive guidance for healthcare practice. Instead, they should be regarded as illustrations for the practical utility of research into classes of learners. That being said, the high degree of similarity between the present study's classes and their counterparts in the original research does point to the validity of the study's findings (see supplementary material) [27]. This concordance suggests that the learner groups identified may represent core patterns in learning behavior as established by Schrader, even though not all factors of the original study were comprehensively transferable to the context of type 2 diabetes.

The exploration of classes of learners among PWT2D is meant to serve as a starting point for a broader understanding of how PWT2D process disease-related information. A better understanding of these learning processes could in turn offer insight into why some PWT2D might benefit more from DSME than others. Further studies should therefore be conducted to challenge and refine the classes of learners found in this research. In addition, the influence of learning type on DSME participation and diabetes outcomes such as hemoglobin A1c should also be studied longitudinally. If further research should

corroborate this study's findings, two exemplary and specific ways in which the found groups of learners might be addressed: 1) using personal goal-setting and progress monitoring as a way of specifically supporting insecure learners in their management of the disease. 2) offering more complex and theoretical optional course material in diabetes education to satisfy theorist learners.

Further studies might also find additional factors, beside ES, that influence class membership and class characteristics. Based on more robust findings on learner classes among PWT2D, tailored diabetes interventions could be designed to address homogeneous groups of PWT2D.

4.3. Practice Implications

It is important for diabetes care and education specialists to be aware of the vulnerability of people with lower ES and, more generally, issues surrounding educational and social background in diabetes care. Socioeconomic status plays an important role in the prevalence and outcome of type 2 diabetes [23,39–41]. Yet, the heterogeneity of groups defined by ES or other social factors makes them inappropriate targets for tailored diabetes services and programs [44]. Intentionally segregating PWT2D into groups by social background for healthcare services is therefore not a viable option. Classes of learners, on the other hand, represent more homogeneous groups that can be used for targeted healthcare interventions. Precise strategies that focus on group characteristics could address PWT2D's specific needs, which seems especially promising regarding more vulnerable patient groups.

Identifying classes of learners with homogeneous distribution of learning traits and preferences can help guide the design of DSME and diabetes care. Among educators, such as healthcare professionals, raising awareness about the impact of learning types appears crucial. This awareness could be promoted using the mandatory courses required for obtaining DSME teaching certifications. On the PWT2D's side motivation plays a pivotal role in the success of learning processes [17,56]. Adapting learning materials to different learning types can help to enhance motivation and thereby increase the participation rate and effectiveness of DSME by addressing individual preferences more accurately. For example, while theorist learners regard learning as an end in itself, insecure learners need more practical references to achieve motivated learning.

In practice, this implies that theorists might be provided with additional background material to satisfy their curiosity, while insecure learners might benefit from emphasizing the everyday value of the provided information. Casual and versatile learners seem to lie somewhere in between in their need for applicability and in their relationship to abstract learning material.

Due to very limited resources within the German healthcare system, simultaneous enhancements for all learning types in DSME do not seem viable. Thus, the initial focus should be on insecure learners, who tend to benefit the least from the current DSME structure. Nonetheless, in order to increase the overall participation rate and efficiency of DSME and mitigate the consequences of inadequate disease management, the midterm aim should be to develop tailored approaches for all types of learners. An initial step could be to develop brief questionnaires for PWT2D to complete before enrolling in DSME, allowing educators to better tailor the programs to their learning needs.

Ethics approval and consent to participate

The Ethics Review Committee of the Medical Faculty at Martin Luther University of Halle-Wittenberg approved of the study. All participants were given comprehensive information material and gave informed consent to the use of their data for further analysis, either in written or digital form. All the study methods were performed in accordance with relevant guidelines and regulations.

The authors confirm that all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

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CRediT authorship contribution statement

Anja Knöchelmann: Writing – review & editing, Writing – original draft. **Astrid Fink:** Writing – review & editing, Funding acquisition, Conceptualization. **Thomas Frese:** Funding acquisition, Conceptualization. **Karl Vince Healy:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis. **Tobias Rähse:** Writing – review & editing, Writing – original draft. **Solveig Weise:** Writing – review & editing.

Declaration of Competing Interest

The authors declare no competing interests.

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Author contributions

AF and TF designed the study and acquired the funding. KVH performed the statistical analysis and wrote the manuscript, with supervision from AK and TR. AK, SW, TR and AF provided comments on the manuscript.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pec.2024.108466.

Data Availability

Data can be made available upon reasonable request to the corresponding author.

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