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SUMMARY OF PhD THESIS

THE COGNITIVE AND MOTIVATIONAL CORRELATES OF DIABETES

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SUMMARY

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Introduction

In this study, we have chosen to focus on **Cognitive and Motivational Correlates of diabetes**, and we have conceived it on two levels. The first part, with a meta-analysis and a quasi-experimental survey, is studying cognitive dysfunctions, a chronic complication of the diabetes, being a controversial topic in the specialty literature. The second part of the study examines the knowledge level and motivational profile of people with diabetes, aiming to identify the factors that may play an important role in the behavior of patients to maintain health. This study proposes the exploration of possible intercultural differences of motivation towards treatment and their role in glycemic control in patients with diabetes in Transylvania - Romania, Hungary and the USA.

The objectives of the study

The theoretical objectives

Acknowledging these problems, the overall objective of the thesis is to clarify the contradictions arisen on the relationship between diabetes and cognitive functions, then the study searches the cause of the low adherence (knowledge linked to diabetes and motivation). The study seeks a reasonable answer to the question whether differences and similarities can be found between patients with diabetes in relation to the quality of glucose metabolism, so that we can define some characteristic dimensions of the group that are necessary for a proper self-care.

Methodological objectives

The methodological objectives are to obtain information on the diagnostic value of the scale used in the study of memory (WMS-R) related to glucose metabolism and also the validation of the DKQ -24 questionnaires and of the scales used in studying of motivation, SELF - DETERMINATION THEORY QUESTIONNAIRE PACKET FOR DIABETES.

Practical objectives

Based on the results of the analyzed studies, the objective of this thesis is to clarify the contradictions occurred in specialized literature regarding the link between diabetes

and cognitive dysfunctions. Simultaneously, the work attempts to identify the factors that influence the behavioral change in patients with diabetes to motivate them to participate to their own care in order to improve and maintain health, which plays an important role in preventing the alleged complications of the disease, among which there would be cognitive dysfunctions. Based on these results we propose the formulation of theoretical and practical suggestions related to the future intervention programs with a similar theme.

The organization of the study

The thesis is structured into six chapters and five studies, organized in a logical flow being treated progressively the problems arisen from the established objectives. Synthesis in these chapters was thematically organized, but also in the order of the development of the researches.

Keywords and phrases:

diabetes, type 1 diabetes, type 2 diabetes, psychosomatic, psychosocial, personality, emotion, cognition, cognitive function, memory, WMS-R, glycemic control, diabetes-related knowledge, motivation, self-determination theory, TSRQ-D, HCCQ-D, PCDS, intrinsic motivation, extrinsic motivation, autonomy, competence, relatedness.

CHAPTER 1.

Psychological correlates of diabetes

Diabetes is a chronic psychosomatic disease and late complications can affect the entire body, requiring specific attention on the psychological component of the disease too, not only on the somatic one. Therapeutic targets in diabetes are the prevention of acute and chronic complications and psychosocial integration.

Somato-psychic rebound is amplified by the existence of numerous disorders, consecutive to diabetes, like behavioral (Rudan et al., 2003), emotional (Polonsky, 2000; Eapen et al., 2006 Ponzo et al., 2006) and cognitive (Kodl, Seaquist, 2008; Brands et al., 2007, van de Berg et al., 2010) disorders.

Diabetic patient must become co-therapist in the management of his treatment. An informed patient is better suited to the disease, but knowledge about diabetes itself haven't resulted in improved glycemic control (Marsh, 2003), being also particularly important the motivation for treatment (Osborn, Egede, 2010). Personality characteristics may affect the ability and willingness of a patient with diabetes to follow a prescribed regimen to achieve adequate glycemic control (Grey et al, 1998; Hanninen et al., 1999). Picture of the disease depends on its objective characteristics (the disease evolution, the severity of complications) (Wasserman, Trifonova, 2006), but cannot be ignored that in modern society is given importance of youth, beauty and health (DiMatteo, Haskard, Williams, 2007).

The relationship between quality of life and diabetes is bidirectional. On one hand, medical and psychosocial aspects of diabetes negatively affect quality of life, on the other hand, deterioration of quality of life negatively influences self-management disease (Jacobson, 2004).

CHAPTER 2.

The influence of the diabetes on cognitive functions

A lot of studies (Awad et al., 2004; Brands et al., 2005; Gaudier et al., 2008; Naguib et al., 2009, Jacobson et al., 2007, McAulay et al., 2006, Cukierman - Yaffe et al., 2009, van de Berg et al., 2010; Christmana et al., 2010; Kodl and Seaquist, 2008) reported the negative impact of diabetes on cognitive abilities. But results are inconsistent and vary from one study to another (Pasquier, 2010). Nature and etiology of the factors suspected to determine the cognitive deficits in diabetes vary between studies, as measured variables. A variety of cognitive deficits were associated with diabetes (Arvanitakis et al., 2006; Debling et al., 2006; Van Harten et al., 2007), but there are studies that found no significant correlation between diabetes and cognitive impairment (Lindeman et al., 2001 Kumari et al.2005).

2.1. Study no. 1

Meta-analysis: Experimental evidences on the influence of diabetes on cognitive functions

2.1.1. Objectives and hypotheses

Objectives

Our main objective was to determine the intensity of the relationship between diabetes and cognitive deficits, obtaining an overall picture regarding the influence of diabetes on cognitive functions. We also propose identifying the role of the type of diabetes, of glycemic control and of the time spent from the beginning of the illness, these being the factors involved in impaired cognitive processes.

Hypotheses

1. We can detect significant differences between the group of adults with diabetes and the group of healthy adults at cognitive functions level.

2. We can detect significant differences in patients with type 1 and type 2 diabetes on the components of cognitive processes.

3. We can detect significant differences in patients with diabetes according to the time spent onset and by an ordered or disordered glucose metabolism, on the components of cognitive processes in both types of diabetes.

2.1.2. Methods and Procedures

The selection of the studies

The search to identify the studies was conducted in MEDLINE, Pubmed, ScienceDirect using the search phrase : cognition, cognitive functions, memory, attention, learning, executive functioning, information processing, intelligence, and intellectual. They were combined with terms such as : diabetes, type 1 diabetes, type 2 diabetes.

Abstracts were examined to determine whether the studies met the following inclusion criteria :

1) published or available in English

2) included people aged between 18 to 65 (mean) years, diagnosed with type 1 diabetes or type 2 diabetes

3) had a defined control group (healthy control subjects)

4) studies provide sufficient information on the characteristics of the participants, methodological features and conceptualization of factors

5) evaluated cognitive performance using standard neuropsychological tests to normal blood glucose

6) The test results were presented for the experimental and control groups (means and SD) and / or exact statistics

Following the eligible analysis, in the meta–analysis were included a number of 9 studies,from which 3 were studies of DZ type 1 and 6 were of DZ type 2, all being included in the final evaluation.

Encoding of studies

Encoding of studies and participants characteristics

Encoding general characteristics of the studies was directly, based on information found in the study. We codified the type of the study, the number of the subjects, the age of participants, the type of diabetes, time spent from the beginning of the disease, the glycemic control (HbA1c), the criteria for inclusion and exclusion of participants.

Classification of cognitive domains

Various tests have been used in studies to assess similar aspects of cognition, or the same test was used to evaluate different areas for which we have classified the tests used in the studies included in the meta-analysis by the twelve areas according to the classification relevant in the field (Strauss, Sherman, and Spreen, 2006; Groth-Marne, 2009, Lezak 2004).

Encoding of cognitive domains

Most of the studies have shown a variety of effect sizes, being first calculated a total of 89 effect sizes and after aggregation obtaining a total of 57 effect sizes for all the 12 areas of cognitive domains. Media and SD (standard deviation) aggregate were used to calculate Cohen's d for diabetes on control groups too.

Data processing

Statistical data processing has been done by using the program Meta-Analysis Calculator (http://www.lyonsmorris.com/ma1/index.cfm) and forms by hand.

2.1.3. Results

Influence of diabetes on cognitive functions

The effect size is the highest value in immediate verbal memory (d = -0.85, R = -0.71) on psychomotor activity (d = -0.71, R = -0.71) and overall intellectual abilities (d = -0.68, D = -0.68).

Influence of type 1 and type 2 diabetes on cognitive functions. Meta-analysis of the subgroups.

Adults with type 1 diabetes showed lower performance than control subjects in all areas. Effect size is the highest value in psychomotor activity (d = -0.66, R = -0.69).

Adults with type 2 diabetes; the effect size has the most increased value at the immediate verbal memory (d = -1.08, R = -1.12), followed by psychomotor activity (d = -0.82, R = -0.82).

We performed a **comparison between the two types of diabetes** using the effect sizes which show the impact of diabetes on cognitive functioning. Although there are differences in the effect size between the results obtained with type 1 diabetes group (d = -0.4156) and those from the sample with type 2 diabetes (d = -0.5295), the effect of diabetes on cognitive functions is higher in type 2 diabetes, but the difference between the two groups is not significant (t = 0.827, p =.41). The two types show no difference in the average size of the effect (in respect of all measured cognitive domains in this study), which means that the diabetes does not have any effect on the degree of deterioration of cognitive functions. However, the model of cognitive dysfunctions in the two types is different, other groups of cognitive functions are damaged in the two types of diabetes.

The role of glycemic control and of the time spent from the beginning of the disease in affecting the cognitive processes in diabetics

The predictor role of the time spent from the beginning of the disease in affecting the cognitive processes

Here we performed the linear regression analysis between the effect size of cognitive functions and previous years of disease onset. Statistical evidence does not support the hypothesis that previous years of disease onset would have any effect on cognitive functions, the results were not significant for any of the 12 cognitive domains examined.

The predictor role of glycemic control in affecting cognitive processes

Here we performed the linear regression analysis between the effect size of cognitive functions and glucose values (hemoglobin glycation, HbA1C). The statistical sample among the 12 selected areas only for psychomotor activity supports the hypothesis that glycemic control would be predictive on cognitive functions ($R2 = 0.99$, $p = .02$).

2.1.4. Discussions and conclusions of the study

The results of this study support the hypothesis that there is a link between diabetes and cognitive dysfunction. The results of the meta-analysis showed a significant difference in cognitive performance compared to healthy subjects in both types of diabetes. Between the average effect sizes (in respect of all cognitive domains measured in this study) of the two types, we did not find significant differences, but still should be noted that the effect size of diabetes on cognitive function is higher in type 2 diabetes, our data confirming the study of Brands et al. (2007).

Of all the functions tested in the meta-analysis, the effect size has the highest value in psychomotor activity, only to psychomotricity the largest effect being calculated in both types of diabetes. Our data are in accordance with the meta-analysis of Jacobson et al. (2007) regarding the psychomotricity.

Chapter 3.
Diabetes mellitus and memory functions

Regarding the issue of memory disorders in diabetes, the study results are inconsistent, often with a high degree of ambiguity due to discrepancies between methods of measurement and quantification of memory. Main reason to this is its not enough known nature and its intricate and different approaches studies (Desrocher & ROVET, 2004). Another issue that is not yet clarified cover the differences of cognitive dysfunctions between the two forms of diabetes, type 1 and type 2.

3.1. Study no.2
Glucose metabolism and memory functions
in adults with diabetes

3.1.1. Objectives and hypotheses

Objectives

This study investigates the memory of people with type 1 and 2 diabetes compared to healthy people. The study seeks the answer to the question whether in global cognitive deficiency in diabetics we can define some dysfunctions on the components of memory level(verbal memory, visual memory, general memory, attention and concentration, memory, delayed and working memory) that are characteristic of the group and by analyzing the existing possible dysfunctions. We can try to identify differences and similarities between diabetic (type 1 and 2) to the quality of glucose metabolism.

Hypotheses

1. We can detect significant differences between the group of adults with diabetes and healthy adults group to the memory components level separately for the two types of diabetes (type 1 and type 2).
2. We can detect significant differences in patients with diabetes mellitus, according to an ordered or disordered glucose metabolism, on memory components, separately for both types of diabetes (type 1 and 2).
3. We can detect significant differences between the group with type 1 diabetes and the group with type 2 diabetes on memory components.

3.1.1. Method and Procedure

Participants

The study sample consists of 71 (N = 71) adult participants, homogeneous by age, sex and education. The inclusion criterion was that the participants to be Hungarian speaking

adults aged between 40 and 55 years and an average education level (high school or college). Participants were from Harghita County, 41% from urban and 59 % from rural.

Diabetics group consists of 37 people with diabetes, subdivided by type of diabetes. To diabetics group, the criterion for selection was to have been diagnosed as diabetic at least 5 years ago.

Type 1 diabetes group

The study sample consists of 16 type 1 diabetic participants. From type 1 diabetes evaluated, 7 (43.8 %) are with balanced diabetes, with a good glycemic control, HbA1c <7%, while the disease duration being 28 years (SD = 9.36). 9 patients (56.3 %) are unbalanced diabetes with inadequate glycemic control, HbA1c > 7% and the duration of illness being 23.66 years (SD = 7.33).

Type 2 diabetes group

The study sample consists of 21 type 2 diabetic participants. Of type 2 diabetes evaluated, 10 (47.6 %) are with balanced diabetes, with a good glycemic control, HbA1c <7%, the disease duration being 7.2 years (SD = 2.52), and 11 patients (52.6 %) are unbalanced diabetes with inadequate glycemic control, HbA1c > 7%, the disease duration being 7.09 years (SD = 2.3).

The control group consists of 34 healthy adults. The selection criteria were lack of chronic diseases and a good health, with a mean age of 46.58 years (SD = 4.56, Min 40, Max 55).

Instruments

The diabetic participants were asked to provide medical and biographical data reports about diabetes using The observation sheet. Diabetic profile and those in the control group were asked to provide medical and biographical data using observation sheet : general clinical. From family medicine cabinets with patients consent were collected from medical records of patients with diabetes DATA on the last glycosylated hemoglobin (HbA1c). All participants were assessed by a psychometric test WMS -R memory.

Data processing

Data collection was followed by their introduction into the database. Statistical data processing was performed using SPSS (Statistical Package for the Social Sciences) version 20.0.

3.1.1. Results

Type 1 diabetes group

The association between memory performance and glycemic control,the disease duration, the education level and the age to the group of type 1 diabetics

The regression analyses have shown that glycemic control was a significant negative predictor of delayed memory (Beta = -.891, t = -7.338, p =.00) explaining 80% of their variance (R Square =.794) of verbal memory (Beta = -.817, t = -5.294, p =.00) explaining 66% of their variance (R Square =.667) overall memory (Beta = -.810, t = -5.166, p =.00), explaining 65% of its variant (R Square =.656) and visual memory (Beta = -.704, t = -3.705, p =.002), explaining 49% of its variant (R Square =. 495). Glycemic control is negative and significant predictor working memory control loop back (Beta = -.554, t = -2.490, p =.026) and working memory (beta = -.522, t = -2.289 ; p =.038), explaining 30% (R Square =.307) and 27% (R Square =.272) of their variance.

The results showed that disease duration is significantly positive predictor for delayed memory (Beta =.499, t = 2.155, p =.049) and explained 25% of its variance (R Square =.249).

Differences between the group of adults with type 1 diabetes and the group of healthy adults on memory components level

The results show that healthy adult group has significantly better performance level in delayed memory (t = -3.241, p =.003) and verbal memory (t = -2.187, p =.03) than the group of adults with type 1 diabetes, meaning that diabetes affects these cognitive functions.

It is important to note that there is a significant difference between the two groups and the attention and concentration (t = 2.032, p =.04), but here diabetes group (M = 77.75) has a significantly better performance than the adult group healthy (M = 73.73).

Among the measured components memory, visual memory and memory in general we did not find significant differences between the two groups, similar to the case of working memory.

Differences between patients with type 1 diabetes by glycemic control at the memory components level

The results show that diabetes group with balanced glycemic control has significantly better performance levels at all measured memory components : verbal memory (t = 4.864, p =.00), general memory (t = 5.245, p =.00), delayed memory (t = 5.841, p =.00), visual memory (t = 4.427, p =.001), working memory (t = 4.138, p =.001) ML control loop before (t = 2.643, p =.021), ML control loop back (t = 3.518, p =.003) than the control group balance.

The diabetes group with balanced glycemic control has a good performance level to both attention and concentration (t = 2.223, p =.043) than the group with an unbalanced control, but not very strong, meaning however that these cognitive functions are sensitive to glycemic control.

Type 2 diabetes group

The association between memory performance and glycemic control, disease duration, education level and age to the group of type 2 diabetics

The regression analysis have shown that glycemic control was a significant negative predictor of verbal memory (Beta = -.861, t = -7.363, p =.00) explaining 74% of its variance (R Square =.740) of general memory (Beta = -.848, t = -6.969, p =.00) explaining 72% of its variance (R Square =.719), delayed memory (Beta = -.739, t = -4.777, p =.00), explaining 55 % of its variance (R Square =.546) and significant predictor of visual memory, (Beta = -.730, t = -4.730, p =.000) explaining 53 % of its variance (R Square =.533).

Differences between the group of adults with type 2 diabetes and healthy adults group in the memory components

The results show that the group of healthy adults has a significantly better level of performance in delayed memory (t = -9.339, p =.00) and verbal memory (t = -3.156, p =.003)

than the group of adults with type 2 diabetes, meaning that type 2 diabetes affects the cognitive functions. Among other memory components measured in attention and concentration, visual memory and memory in general did not find significant differences between the two groups, nor the working memory, the results suggest that damage to these cognitive functions type 2 diabetes do not play an important role.

Differences between patients with type 2 diabetes by glycemic control on the component level memory

The results show that the group of diabetes with a balanced glycemic control has a significantly better level of performance in verbal memory ($t = 8.715$, $p = .00$), in general memory ($t = 7.220$, $p = .00$) in delayed memory ($t = 4.760$, $p = .00$) and visual memory ($t = 4.208$, $p = .00$) than the control group balance. Among measured memory components, in attention and concentration we did not find significant differences between the two groups, nor the working memory.

Comparison of the two types of diabetes in memory components

In order to analyze the third hypothesis, the calculations were carried out with the sample T, to determine the differences between the memory variables measured in the two groups of diabetes. The results show a significant difference between the two groups by type of diabetes in attention and concentration ($t = 5.074$, $p = .00$), the delayed memory ($t = 3.306$, $p = .002$) in working memory ($t = 2.492$, $p = .018$), ML with control loop before ($t = 2.622$, $p = .013$), the group with type 1 diabetes has significantly better performances than the group with type 2 diabetes. To the other measured components(verbal memory, visual memory, general memory, ML with control loop back) we didn't find significant differences between the two groups, the results suggesting that the type of diabetes, in the deterioration of these cognitive functions, doesn't play an important role.

3.1.1. Discussions and conclusions of the study

Our results, as previous studies, suggest that, to both types of diabetes, we can specify an interdependence between glucose metabolism and cognitive dysfunctions. Comparing the results of the study with the results of our meta-analysis regarding glycemic control we found some contradictions in meta-analysis, one area fitting in the parameters of significance, respectively psychomotor activity, and in other cognitive domains glycemic control was not predictive. In terms of disease duration, the results of this study coincide with the results of meta-analysis, the disease duration not being associated with cognitive deterioration, as emphasized by both studies.

Chapter 4.

The level of knowledge and motivational components within diabetes in relation to the quality of glucose metabolism

Previous studies on the relationship between the **knowledge** in diabetes and related variables about the self-management of the disease reported conflicting results. There are studies that show that this lack of awareness may be the main factor affecting attitudes toward care (Jabber et al., 2001 Sivaganam et al., 2002). There are other studies with evidence that the level of knowledge doesn't always lead to changes in behavior (Dorresteijn et al., 2010 Formosa Vella, 2012).

The self-determination theory (SDT) posits that people are oriented towards physical and mental health, people are more susceptible to adopt healthy behaviors when basic psychological needs for autonomy, competence and relationship are accepted (Williams et al., 2009). The self -determination theory has been applied to explore the motivational base of joining the long-term prescription drugs (Williams et al., 2005) and several health behaviors in 184 data sets from around the world (Ng et al. 2012). Figure 2 shows the SDT model of health in patients with diabetes (after Williams, Freedman, and So, 1998, p 1645, Williams et al., 2009, p 490)

The cause of low adherence is a multifactorial one, an important issue is the lack of knowledge about the disease and the patient's lack of motivation to treatment (Win et al., 2006 Osborn, Egede, 2010).

4.1. Study no. 3

Validation study of the Diabetic Knowledge Questionnaire and Self- Determination Theory Questionnaire Packet for Diabetes. Adjustment to Hungarian

4.1.1. Objectives

The main objective of the study is to obtain an overview on the validity of the questionnaires (Diabetic Knowledge Questionnaire and Self- Determination Theory Questionnaire Packet for Diabetes) for diabetics in general, but will be also made separately for the two subgroups of diabetic, namely type 1 and type 2 diabetes.

4.1.2. Adapting the questionnaire Diabetic Knowledge Questionnaire (DKQ -24) to Hungarian

4.1.2.1. Method and Procedure

Participants

To achieve the questionnaire calibration there was achieved a total of 305 participants. The main inclusion criteria were patients diagnosed with diabetes for at least 5 years, Hungarian speakers, aged between 18 and 65 years (M = 55.16, SD = 9.71). Of the total participants, 112 were type 1 diabetes, mean age being 50.47 (min = 18, max = 65, SD = 13.09) and 193 were type 2 diabetes, the average age was 57.88 (min = 39, max = 65, SD = 5.47). Of the total of participants, 166 (54.4 %) were female and 139 (45.6 %) male.

Instruments

The 24-item questionnaire **Diabetic Knowledge Questionnaire (DKQ -24)** derived from the original DKQ -60 (Garcia et al., 2001). DKQ -24 consists of 24 questions measuring general knowledge about diabetes. Questionnaire obtains information regarding the understanding of the respondents on the cause of diabetes, types of diabetes,self-management skills as well as complications of diabetes.

4.1.2.1. Results

Validity aspect

In the first phase translating the questionnaire was done, which was supervised by one English translator with Hungarian native language and a physician specialized in diabetes. The first version of the translated questionnaire was applied to 10 Hungarian participants with diabetes. After that, we conducted interviews with subjects to determine the validity of the questionnaires aspect. Questionnaires were also evaluated by 4 psychologists and 4 medical professionals. In the next step, they started to correct and change form, depending on the arguments of the subjects and specialists.

Content validity (internal)

To determine the internal consistency of the scale, we have used Alpha Cronbach coefficient (α), which has a variation range between 0 and 1, the level of.70 being accepted as a limit by many researchers. As shown, Alpha Cronbach reliability of the scale shows good indices.

Cronbach Alpha index for the 24 items of this scale in Hungarian is α =.74 (N = 305). Cronbach Alpha index for the 24 items of this scale in Hungarian for type 1 diabetes group is α =.70 (n = 112) and type 2 diabetes group is α =.75 (n = 193).

The value of Guttman Split-Half coefficient of.72 (r =.579) is supported by the internal consistency of the scale.

Construct validity (conceptual)

In support of the construct validity term there was no significant association between patients' age ($r = -.01$, $p = .77$) and the performance to questionnaire. Older age is seen as a barrier to education in diabetes (e.g. Bruce et al.2003), but we must specify that our sample was younger than 65, this could be the reason why the results show no association between age and knowledge as would be expected. There are few studies (Arora et al., 2011) who sustain that the duration of the disease should have a positive effect on knowledge, but according to our results there is no relationship between the two variables ($r = .09$, $p = .09$).

The results have also been compared between gender, male participants having a significantly higher performance ($t = -2.25$, $p = .02$) than women. According to previous studies (Murata et al., 2003 Gunay et al., 2006), low level of education is a negative factor of knowledge and must be specified that the men in our sample had a higher educational level than women.

Comparing the results of the questionnaire between the two types of diabetes, people with type 1 diabetes have higher scores than those with type 2 diabetes ($t = 2.93$, $p = .00$). Our results are strengthened by previous studies (e.g., Eigenmann, 2011).

Participants in the study come from five counties in Transylvania and with the ANOVA test we found no statistically significant differences ($F = 0.98$, $p = .41$) between groups regarding score questionnaires, thus also confirming the validity of the scale, as the groups were similar in perspective to age, gender and type of diabetes.

4.1.3. Adapting questionnaires

Self- Determination Theory Questionnaire Packet for Diabetes to Hungarian language

4.1.3.1.Method and Procedure

Participants

To achieve the calibration of the questionnaire we included 305 participants. Participants were patients from the group on which was made the adapting of the DKQ -24 questionnaire.

Instruments

Self-Determination Theory Questionnaire Packet for Diabetes contains 3 questionnaires which were developed to evaluate the contained constructions at the self-determination theory (Deci &Ryan, 1985).

Treatment Self-Regulation Questionnaire (TSRQ -D) evaluates the reasons why people engage in some healthy behavior, the scale being divided into two subscales : Autonomic Regulation and Controlled Adjustment.

Perceived Competence for Diabetes Scale (PCDS) assesses the degree to which participants feel confident about the possibility of adopting changes in their behavior.

Modified Health Care Climate Questionnaire for Diabetes (HCCQ -D) assesses how patients perceive the relationship with the medical staff.

4.1.3.2. Results

The translation and adaptation of TSRQ -D questionnaire in Hungarian

Aspect validity

In the first phase the translation of the questionnaire was done, which was supervised by one native Hungarian English translator and a psychologist. The first version of the translated questionnaire was applied on 10 Hungarian participants with diabetes.After, we

conducted interviews with subjects to determine the validity of the questionnaires aspect. Questionnaires were also assessed by 4 psychologists. In the next step, we started to correct and change form, according to the arguments of the subjects and specialists.

Construct validity

Construct validity analysis was done by making a drawing of components to identify the main constructs. We used principal component analysis method by applying some Varimax type rotations(Kaiser normalization). Exploratory factorial analysis led to the identification of 3 factors, in order to improve the instrument; at this stage we had to remove 2 items. After this step, we realized the factorial analysis of the 17 items retained. The factorial analysis led to the identification of 2 common factors explaining 58.8 % of the total variance.

Result analysis revealed a model with two factors according to the theory :

Factor 1 – Controlled adjustment consists of 11 items, all items have a higher loading of.50 (between.59 and.85) and explain 39.44 % of the total variance of items reflecting how they evaluate their extrinsic motivational state due to interaction with the disease.

Factor 2 - Autonomic adjustment consists of 6 items showing high loading of.60 (between.66 and.78) and explaining 19.36 % of the total variance of the items, reflecting how they assess their condition as a result of intrinsic motivational interaction with the disease.

Internal Validity

Alpha Cronbach index for the 17 items of this scale is α =.89 (N = 305). Because the scale is different between controlled motivation (extrinsic) and autonomic motivation (intrinsic) Alpha Cronbach index was calculated for the two subscales separately for RA and RC respectively.

The Alpha Cronbach index for the 11 items of subscale **Controlled Adjustment** in Hungarian is α =.93 (N = 305), which shows a very good internal consistency. The Alpha Cronbach index for the 11 items of this scale in Hungarian for type 1 diabetes group is α =.91 (n = 112) and type 2 diabetic group is α =.93 (n = 193).

The Alpha Cronbach index for the 6 items of the **Autonomic Adjustment** in Hungarian subscale is α =.82 (N = 305), indicating a very good internal consistency. The Alpha

Cronbach index for the 6 items of this scale in Hungarian for type 1 diabetes group is α =.81 (n = 112) and type 2 diabetic group is α =.82 (n = 193).

The translation and adaptation of PCDS questionnaire in Hungarian

Aspect Validity

In the first phase, the questionnaire translation was done, the procedure being similar to the one in TSRQ -D questionnaire.

Construct validity

Ulterior, we conducted a factorial analysis of the 4 items. The factorial analysis led to the identification of a single common factor (according to theory) explaining 73.1 % of the total variance.

Internal Validity

The Alpha Cronbach index for the 4 items of this scale in Hungarian is α= .87 (N= 305).

We calculated the Alpha Cronbach index separately for the two subgroups of diabetics. Its amount, depending on the 4 items of the scale in Hungarian, is α =.82 (n = 112) for the group of diabetes type 1 and for the group of type 2 diabetes (n = 193) is α =. 90.

The translation and adaptation of the HCCQ-D questionnaire in Hungarian

Aspect Validity

In the first phase was conducted the translation of the questionnaire; the procedure was similar to that used to adapt the questionnaire TSRQ-D.

Construct validity

We conducted the factorial analysis of the 6 items. The factorial analysis led to the identification of a single factor that explained 59.5% of the total variance. The degree of saturation of the items is shown in the table below .

Internal Validity

The Alpha Cronbach index for the 6 items of this scale in Hungarian is α =.85 (N = 305).

We also realized the calculation of the Alpha Cronbach index separately for the two subgroups of diabetics. The Alpha Cronbach index is α =.79 (n = 112) for the group with type 1 diabetes and α =.87 (n = 193) for the type 2 diabetes group.

4.1.4. Discussions and conclusions of the study

Our results also show that translated instruments have good psychometric properties and thus can be used in future studies. Questionnaires have good psychometric properties for both types of diabetes, but still should be specify that to the population with type 2 diabetes the questionnaires have better psychometric properties than the population with type 1 diabetes.

4.2.Study no. 4

The evaluation of knowledge level and motivational components in patients with diabetes and their relationship to glycemic control.

4.2.1. Objectives and hypotheses

Objectives

The study examines the knowledge level and motivational profile of people with diabetes, separately for the two types reported to glycemic control. The study seeks the answer to the question whether in the knowledge of diabetes and of motivational profile can be identified differences and similarities between diabetics in relation to the quality of glucose metabolism, so that we can define some characteristic group sizes needed for a proper self-care.

Hypotheses

1. There is an association between the level of knowledge of diabetes vs. glycemic control. According to an ordered or disordered glucose metabolism we can detect significant differences in patients with diabetes in the diabetes-related knowledge.

2. There is an association between the motivational components of treatment adherence and glycemic control. We detect significant differences in patients with diabetes according to an ordered or disordered glucose metabolism in the motivational components (autonomy, competence, networking).

3. There is an inter-relationship between the knowledge and the motivational base (autonomy, authority, relationship) of the adherence to treatment, being predictors of glycemic control in both types of diabetes.

4.2.2. Method and Procedure

Participants

The study sample consists of 259 participants with diabetes, the selection criterion being to have been diagnosed as diabetic at least 5 years ago, adults (ages between 18 to 65 years). Subjects were divided into two groups according to the type of diabetes, such as: 92 adults with type 1 diabetes (n = 92) and 167 adults with type 2 diabetes (n = 167).

Type 1 diabetes group

The study sample consists of 92 participants with type 1 diabetes. Subjects were divided into two subgroups according to glycemic control, homogeneous by age, sex and education. Of type 1 diabetes evaluated, 30 (32.6 %) are with balanced diabetes, meaning with a good glycemic control, and 62 (67.4 %) are with unbalanced diabetes, with an inadequate glycemic control.

Type 2 diabetes group

The study sample consists of 167 (n = 167) of type 2 diabetic participants. Subjects will be divided into two subgroups, depending on glycemic control, homogeneous by age, sex and education. Of type 2 diabetes evaluated, 80 (47.9 %) are with balanced diabetes,

with good glycemic control and 87 (52.1 %) are with unbalanced diabetes, with an inadequate glycemic control.

Instruments

Participants were asked to provide biographical data and medical history of diabetes using **The observation form : Diabetic profile**, and with the consent of patients from family medicine cabinets we have collected from medical records last known values for **glycosylated hemoglobin (HbA1c)**. In the next step the patients were asked to complete the following questionnaires :**Diabetic Knowledge Questionnaire (DKQ -24)** and the **Self-Determination Theory Questionnaire Packet for Diabetes (TSRQ -D, PCDS, HCCQ - D).**

Data processing

Data collection was followed by entering data into the database. Statistical data processing was done using SPSS (Statistical Package for the Social Sciences) version 20.0.

4.2.3. Results

Type 1 diabetes group

The level of knowledge of diabetes vs. glycemic control

Because the first part of our initial hypothesis was not validated, the results show that there is no direct significant association between knowledge of diabetes and glycemic control ($r = -.15$, $p = .14$) and we oriented to evaluate using more specific calculation methods. Results in our sample showed the important role of educational variable. In order to obtain more precise data, the linear regression was calculated for each variable where initial results showed significant association, namely the knowledge of diabetes and glycemic control. The performed regression analyzes also showed that the educational level was a significant predictor of diabetes-related knowledge (Beta = 0.359, $t = 3.652$, $p = .00$) explaining 13% of their variance (R Square = 0.129) and negative predictor significant of the glycemic control (Beta = -0.322, $t = -3.224$, $p = .002$), explaining 10% of its variant (R Square =.10).

In order to analyze the second part of the made assumption, calculations were performed with t test, to determine the difference in diabetes-related information between the two groups of diabetics after glycemic control. T test results suggest that there are significant differences between the two groups after glycemic control variable depending on knowledge level (t = -0.09, p =.92).

Motivation vs. glycemic control

To determine the optimal model of predictors for glycemic control in type 1 diabetes group, we performed standard multiple regression analyses, all variables with a predictor role being included step by step into the equation, significantly correlated with glycemic control (RAI and level of education).

The results showed 2 significant patterns. For the sample, the model with the variable of autonomy (RAI) was significant predictor of glycemic control (Beta = -0.368, t = -3.755, p =.00) explaining 14% of their variance (R Square =.135). The model including the 2 factors, namely perceived autonomy (RAI) and education level explained the most of the variance in glycemic control and 18 % (F = 9.715, p =.000, R square =.179). Among the variables included in the model, the perceived autonomy had the most relevant value (Beta = -0.292, t = -2.864, p =.005) compared to the level of education (Beta = -0.222, t = -2.178, p =.03), the contribution of perceived autonomy being higher (Beta = -0.292).

For the sample,the educational level was a significant predictor of autonomy (Beta = 0.340, t = 3.430, p =.001, R Square =.116).

For a more detailed analysis of the association of these two variables, namely RAI and educational level, both being significant predictors of glycemic control, we conducted mediation analyzes using the Sobel Test Calculator (http://www.danielsoper.com/statcalc3/calc. aspx ? id = 31). From these analyzes the level of education was not a significant mediator of the association between RAI and glycemic control (Z = 1.408, p =.15), but RAI showed as significant mediator between education level and glycemic control (Z = 2.867, p =.004).

To testing the SDT model of health in patients with type 1 diabetes, we performed in Romania linear regression analysis between variables of motivation (RAI, PCDS and HCCQ - D). Performed regression analyzes also showed that autonomy support was a significant

predictor of perceived competence (Beta = 0.307, t = 3.057, p =.003) explaining 9% of its variance (R Square =.094) perceived competence being a significant predictor of the autonomy (Beta = 0.353, t = 3.580, p =.001), explaining, however, relatively little of its variance, 13% (R Square =.125). The autonomy is the significant negative predictor of glycemic control (Beta = -0.368, t = -3.755, p =.00), explaining relatively little of its variance, 14% (R Square =.135). According to the analysis presented above, RAI has emerged as a significant mediator between education level and glycemic control.

As shown above we can say that to the sample with type 1 diabetes at Hungarian population from Romania, our data do not fit in all respects to those of the original model from the U.S., failing to reproduce the exact structure of the original model. The original model has three components that mediate disease self- management or glycemic control as measured by HbA1c (relational→ autonomy → competence→ glycemic control). To the model from Romania the order of the two components, namely autonomy and competence reversed (relational→ competence → autonomy → glycemic control).

In order to analyze the second hypothesis, the calculations were carried out with the T sample, to determine the difference between the measured motivational variables at the two groups of diabetics after glycemic control. Our results suggest that in addition to the variable represented by perceived autonomy support (t = 1.378, p =.17), there are significant differences between the two groups in terms of measured motivational variables.

The diabetes group with balanced glycemic control has a significantly higher level of intrinsic motivation (RA) than unbalanced control group (t = 3.021, p =.004) and significantly presents a lower level of extrinsic motivation (RC) (t = -3.003, p =.003). The difference between groups is also significant to the autonomy index (t = 5.754, p =.00) and perceived competence (t = 2.147, p =.03), so the group of diabetes with a good glycemic control has a higher level of autonomy (self-determination) and feels more competent in diabetes self-management.

The association between diabetes-related knowledge and motivational components and their relation to glycemic control

Primary analysis on the entire sample with type 1 diabetes revealed no significant association between the tendency to diabetes-related knowledge and motivational variables. The

results show that there isn't a direct significant association between diabetes-related knowledge and measured motivational variables. Our initial hypothesis was not validated and we could not orient ourselves to more specific calculations.

Type 2 diabetes group

The level of knowledge of diabetes vs. glycemic control

The results show that there is no significant negative association between knowledge of diabetes and glycemic control (HbA1c) (r = -.141, p =.06). Between the knowledge level and the duration of illness there is a significant negative association (r = -.190, p =.014).

Pearson correlation indices show a tendency of association between knowledge and level of education (r =.163, p =.035) and we identified a tendency of strong positive association between the duration of the disease and HbA1c (r =.201, p =.009).

Regression analyzes made have shown that disease duration was a significant predictor of glycemic control (Beta = 0.201, t = 2.634, p =.009) but explained only 4% of its variance (R Square =.040).

The analyzes revealed the important role in our sample of variables duration of the disease and education, both showing a significant negative association with diabetes-related knowledge. The results showed two significant patterns. For the sample case, the model with variable of the disease duration was a significant negative predictor of diabetes-related knowledge (Beta = -0.190, t = -2.486, p =.014) but explained only 4% of their variance (R Square =.036). The model including the two factors, respectively the disease duration and the level of education, explained the most of the variance in knowledge, respective 7% (F = 6.083, p =.003, R square =.069). Among the variables included in the model, a disease duration had a higher explicative power(Beta = -0.207, t = -2.737, p =.007) compared to the level of education (Beta = 0.182, t = 2.409, p =.017), the contribution of duration of illness being greater (Beta = -0.207).

Although the data showed no association between glycemic control and knowledge, the t test results suggest that there are however significant differences between the two groups after glycemic control on knowledge variable (t = 2.327, p =.021).

Motivation vs. glycemic control

The obtained results support the fact that glycemic control is associated with some of the evaluated motivational components. To determine the optimal model of predictors for glycemic control in type 2 diabetes group, we performed standard multiple regression analyses, all significantly correlated variables with glycemic control with predictors role (PCDS, RAI and disease duration) being included step by step in the equation.

The results showed two significant patterns. In the sample, the model with the variable of perceived competence (PCDS) was a significant predictor of glycemic control (Beta = -0.339, t = -4.636, p =.00) explaining 12% of their variance (R Square =.115). The model including the two factors, namely perceived competence (PCDS) and autonomy (RAI) explained most of the variance in glycemic control, respective 16 % (F = 15.592, p =.00, R square =.16). Among the variables included in the model, a greater explanatory power had perceived competence (Beta = -0.270, t = -3.580, p =.00) compared to the autonomy (Beta = 0.222, t = -2.948, p =.004), the contribution of the perceived competence being higher (Beta = -0.270). In the model including all three variables, the disease duration did not result as a significant predictor of glycemic control.

For a more detailed analysis of the association of these two variables, namely PCDS and RAI, both being significant predictors of glycemic control, we conducted mediation analyzes using the Sobel Test Calculator (http://www.danielsoper.com/statcalc3/calc.aspx ? id = 31). From these analyzes RAI did not reveal as a significant mediator of the association between PCDS and glycemic control (Z = 0.161, p =.87) nor PCDS is a significant mediator between autonomy and glycemic control (Z = 0.153, p =.87).

To test the SDT model of health in patients with type 2 diabetes mellitus, in Romania, we performed linear regression analyses between variables of motivation (RAI, PCDS and HCCQ-D). Performed regression analyzes also showed that the autonomy support was a significant predictor of perceived competence (Beta = 0.338, t = 4.620, p =.00) explaining 12% of its variance (R Square =.115) the perceived competence being a significant predictor of the autonomy (Beta = 0.313, t = 4.238, p =.00) explaining 10% of its variance (R Square =.098) and also a negative predictor of glycemic control (Beta = -0.339, t = -4.636, p =.00) explaining 12% of its variance (R Square =.115) and the autonomy is a significant negative predictor of glycemic

control (Beta = -0.307, t = -4.140, p =.00), explaining relatively little of its variance, 9 % (R Square =.094).

The original model has three components that mediate disease self- management, or glycemic control as measured by HbA1c (relationship→ autonomy → competence → glycemic control). To the model for patients with type 2 diabetes from Romania, the order of the two components, namely autonomy and competence, reversed (relationship→competence→autonomy→glycemic control), being similar to the model from Romania of patients with type 1 diabetes. To the pattern of patients with type 1 diabetes, the competence was predictive for autonomy only, not for glycemic control, such as for type 2 patients.

In order to analyze the second hypothesis, the calculations with t- test were carried out on independent samples to determine the differences between the two groups of diabetics after glycemic control. Our results suggest that besides the intrinsic motivation variable (RA) (t = 0.625, p =.53) and perceived autonomy support (t = 1.774, p =.07) there are significant differences between the two groups after the glycemic control, respectively the group with balanced diabetes and unbalanced diabetes group on measured motivational variables. The diabetes group with balanced glycemic control has a significantly lower level of extrinsic motivation (RC) than the group with unbalanced control (t = -3.265, p =.001). The difference between groups is also significant to the autonomy index (t = 3.284, p =.001) and perceived competence (t = 4.372, p =.00), so the group of diabetes with good glycemic control has a higher level of autonomy (self-determination) and feels more competent in diabetes self-management.

The association between diabetes-related knowledge, motivational components and their relation to glycemic control

The results show a strong association between diabetes-related knowledge and autonomy index (RAI) (r =.292, p =.00). Pearson correlation indices show a tendency of negative association between Controlled regulation(RC) and the knowledge of diabetes (r = -.200, p =.01). But we did not find any association between the other motivational variables (PCDS and HCCQ -D) and knowledge.

The results showed that in our sample, the knowledge of diabetes was a significant positive predictor of autonomy (RAI) (Beta = 0.292, t = 3.922, p =.00) but explaining only 9% of its variance (R Square =.085).

4.2.4. Discussions and conclusions of the study

We investigated **the level of knowledge** in patients with diabetes and the relation to glycemic control, the duration of diabetes and the level of education. We found that the metabolic control is associated with knowledge about diabetes, either in type 1 diabetes or type 2 diabetes groups, increasing the educational camp according to which the knowledge does not always leads to changes in behavior (Formosa, Vella, 2012).

We investigated **the motivational profile** after SDT theory (autonomy, competence, relationship) of the persons with diabetes (type 1 and type 2). Our data do not fit in all respects to those of the original model from the U.S., being unable to reproduce the exact structure of the original model. Therefore, the autonomy support is predictive of the perceived competence and competence is predictive of the perceived autonomy, while autonomy is predictive of glycemic control. The difference between the two types of diabetes in Romania is that among the patients with type 1 diabetes the competence is predictive only for the autonomy, not for glycemic control, such as among the type 2 patients.

In the last stage, we investigated **the inter-relationship between knowledge related to diabetes and motivational profile** of people with diabetes in relation to glycemic control, based on previous studies (e.g. Win et al. 2006) which revealed that inadequate knowledge and motivational factors are significant barriers to good glycemic control. Primary analysis on the entire sample with type 1 diabetes revealed no significant association between the tendency to diabetes-related knowledge and motivation variables, our initial hypothesis not being validated, we could not orient to more specific calculations. To the sample of those with type 2 diabetes, the results revealed several tendencies of association. The level of knowledge related to diabetes being correlated with the index in the positive range, in order to determine the prediction model we conducted analyses of linear regression between the two variables. The

results showed that in our sample the levels of knowledge of diabetes were significant positive predictors of autonomy.

Chapter 5.
The intercultural differences of the motivation in patients with diabetes

The SDT is an excellent model for understanding chronic disease management (Williams et al., 2004); based on previous empirical results we can observe a positive association between patient autonomy and health (Ng et al., 2012). According to self-determination theory, the three basic psychological needs are universal, but the satisfaction of any basic need may differ from one culture to another (Deci, & Ryan, 2000). There is evidence that these basic psychological needs are indeed universal (Chirkov, Ryan and Willness, 2005), but there are studies (e.g. Trumbull and Rothstein - Fisch, 2011) which show that the concept of self-determination is linked of culture.

5.1. Study no. 5
The comparative study of motivation in patients with diabetes from Transylvania, Hungary and the USA. The effect of motivation on glycemic control

5.1.1. Objectives and hypotheses

Objectives

We have not found studies investigating the intercultural differences of motivational components in diabetes, in which to be included Hungarian ethnics from Romania.

In this study we proposed to explore the possible intercultural differences of motivation to treatment and their role in glycemic control in patients with type 2 diabetes (the Hungarian ethnicity) from Transylvania, Hungary and the USA.

Hypotheses

1. There are intercultural differences in motivational components of diabetes from Romania (Transylvania), Hungary and the USA.
2. There are intercultural differences in glycemic control in patients from Romania (Transylvania), Hungary and the USA.
3. There are intercultural differences in terms of the relationship between motivation and glycemic control in patients from Romania (Transylvania), Hungary and the USA.

5.1.2. Method and Procedure

Participants

The sample of the study is composed of patients with type 2 diabetes from Romania (Transylvania), Hungary, and the USA. The participants in the study were 1,184 patients diagnosed with type 2 diabetes, of whom 226 were patients of Hungarian ethnicity from Romania (Transylvania), 72 patients from Hungary and 886 patients from the U.S..

The data collection from Hungary was carried out during the three-month internship mobility between 1st of January and 30th of March 2013 at Miskolc Borsod- Abauj - Zemplén County University Hospital. The American sample data are obtained from the database of the Williams, Lynch, Glasgow study (2007), working with a research group at the University of Rochester.

The average age of the participants in the sample from Transylvania was 55.79 years, those from Hungary 59.15 years, while the U.S. participants was 62.92 years.

Regarding the educational level, the American group has the highest level, 85.6 % of participants being with high school, followed by Hungary with 73.6%, and Romania with 57.1%.

Instruments

To evaluate and assign the motivation to the subjects we used **Self-Determination Theory Questionnaire Packet for Diabetes.**

Data processing

Data collection was followed by their introduction into the database. The obtained data were selected and decoded so that we can compare with data collected by us from Romania and Hungary. To establish the relationship between the mentioned factors there were performed calculations using SPSS (Statistical Package for the Social Sciences) version 20.0.

5.1.3. Results

Intercultural differences in motivational components

Intercultural differences in perceived autonomy support and perceived competence in patients from Transylvania, Hungary and the U.S.

We also analyzed the differences between the averages of the three samples to two motivational variables, perceived autonomy support and perceived competence (HCCQ-D and PCDS). To the motivational variables from TSRQ-Dscale, respectively autonomous regulation, controlled regulation and autonomy index (RA, RC and RAI) we didn't have data from the U.S., being unable to perform calculations in the three samples.

To the perceived competence (PCDS) we found no significant differences between participants by country of origin, but to the perceived autonomy support (HCCQ -D) we may notice some differences between the three samples. Participants from Romania present a significant higher level to the perceived autonomy support compared to those from Hungary, and the latter have a significantly lower level than those from the U.S..

Intercultural differences in autonomous regulation, controlled regulation and the autonomy index on samples from Transylvania and Hungary

To the three calculated motivational variables from TSRQ-D scale, namely autonomous regulation, controlled regulation and autonomy index (RA, RC and RAI), with no U.S. data, we compared only the samples from Romania and Hungary.

To analyze the second hypothesis, the calculations were performed with the t test on the independent samples to determine the differences between the group of adults with type 2 diabetes from Romania and Hungary to the motivational components level.

The results show that the group from Romania has a significantly lower level to the autonomous regulation (t = -5.921, p =.00) and autonomy index (t = -5.016, p =.00) compared to the group from Hungary, however to the controlled regulation we found no significant differences between the two groups.

Intercultural differences in glycemic control

To determine the differences in glycemic control (HbA1c) of subjects by country of origin, we performed One-way Anova analyzes. Because the test of homogeneity of variances was significant (Levene statistic), indicating that the variances are not similar in the tested groups, for this factor we performed the Welch test with post-hoc Games-Howell tests. The preliminary analyzes with Welch test showed that there was no significant difference in glycemic control (F = 0.593, p =.554) between the three samples. In this case there is no need for further specific calculations.

Intercultural differences in terms of the relationship between motivation and glycemic control

Intercultural differences in terms of the relationship between motivation (perceived autonomy support and perceived competence) and glycemic control in participants in Transylvania, Hungary and the U.S.

The performed regression analyzes showed that **the perceived autonomy support** was a significant negative predictor of glycemic control just to sample from Hungary (R Square =.113, Beta = -.364, t = -3.272, p =.002). To the sample from Romania (R Square =.008,

Beta = -.088, t = -1.318, p =.189) and the U.S. (R Square =.000, Beta = -.012, t = -.339 ; p =.735) the perceived autonomy support hasn't emerged as a predictor for glycemic control.

We conducted moderator analyzes to determine whether the culture moderates the effect of perceived autonomy support (HCCQ -D) on glycemic control (HbA1c), respective the glycemic control (criterion), perceived autonomy support (predictor) and culture (moderator).

To the sample from **Romania / Hungary** the results showed two significant models. The first model of the two independent variables showed as significant predictor of glycemic control (F = 3.157, p =.044, R square =.021). The second model, including standardized multiplied value of the two independent variables, namely the perceived autonomy support and culture, explained more of the variance in glycemic control, respectively (F = 2.770, p =.042, R square =.027). The first model obtains 2.1 % of the variance in glycemic control, the second model 2.7 % (R Square Change =.007, Sig. F Change =.161) but insignificant statistically. We may therefore say that culture factor has no moderating power on the relation between perceived autonomy support and glycemic control to the sample from Romania and Hungary.

To the sample from **Romania / USA** and to the sample from **Hungary / U.S.** none of the models is significant, so we can say after the following results (see Table 14), that culture has no moderating force on the relation between perceived autonomy support and glycemic control of comparison among the samples from Romania and the U.S., nor to the samples from Hungary and Romania.

Performed regression analyzes showed that **perceived competence** was a significant negative predictor of glycemic control in all three samples, namely sample from Romania (R Square =.103, beta = -.321, t = -5.077, p =. 00), the sample from Hungary (R Square =.126, beta = -.355, t = -3.176, p =.002) and the U.S. sample (R Square =.033, beta = -.183, t = -5.308, p =.00).

We conducted moderator analyzes to determine whether the effect of perceived competence (PCDS) on glycemic control (HbA1c) is moderated by cultural factors, namely glycemic control (criterion), perceived competence (predictor) and culture (moderator).

To the sample from **Romania / Hungary** the results showed two significant models. The first model, the two independent variables emerged significant predictor of

glycemic control (F = 17.124, p =.000, R square =.104). The second model, including standardized multiplied value of the two independent variables, namely perceived competence and culture, explained more of the variance in glycemic control (F = 11.771, p =.000, R square =.107), but the difference is not statistically significant (R Square Change =.003, Sig. F Change =.305).

To the sample from **Romania/U.S.** the results showed two significant models. The first model, of the two independent variables, emerged significant predictor of glycemic control (F = 23.718, p =.000, R square =.044). The second model, including standardized multiplied value of the two independent variables explained more of the variance in glycemic control (F = 17.531, p =.000, R square =.048). The first model explains only 4.4 % of the variance in glycemic control, the second model 4.8 % (R Square Change =.005, Sig. F Change =.026), so we can say that culture is power moderated the relationship between perceived competence and glycemic control the sample of Romania and the USA.

To the sample from **Hungary/U.S**. results showed two significant models. The first model, of the two independent variables, emerged as significant predictor of glycemic control (F = 17.058, p =.000, R square =.037). The second model, including standardized multiplied value of the two independent variables (F = 11.475, p =.000, R square =.037). Both models explained 3.7 % of the variance in glycemic control (R Square Change =.000, Sig. F Change =.563), so we can say that culture has a moderating force on the relationship between perceived competence and glycemic control sample in Hungary and USA.

Intercultural differences in terms of the relation between autonomy and glycemic control between samples from Transylvania and Hungary

Regression analyzes have shown that **autonomous regulation** to sample from Romania has emerged predictor of glycemic control (R Square =.001, beta = -.024, t = -.362, p =.717), but the sample from Hungary (R Square =.096, beta = -.310, t = -2.731, p =.008) analyzes show that self- regulation is a significant negative predictor of glycemic control. Regression analyzes have shown that **controlled regulation** to the sample from Romania is a significant predictor of glycemic control (R Square =.058, Beta =.241, t = 3.715, p =.000), but the sample from Hungary (R Square =.032, Beta =.180, t = 1.533, p =.13) results are not

statistically significant. Regression analyzes have shown that **autonomy** is a significant negative predictor for both samples, and Romania (R Square =.052, beta = -.229, t = -3.518, p =.001) and Hungary (R Square =.167 ; beta = -.408, t = -3.743, p =.000).

At any of the three models has emerged as a moderator culture between motivation variables and glycemic control.

5.1.4. Discussions and conclusions of the study

The results indicate that the factorial structure of motivation and motivational self-regulation strategies is largely similar in the three groups, but appear to be differences in the meaning and / or the effect of some constructs. For example, we did not find differences between participants in terms of country of origin glycemic control. Perceived autonomy support is a significant negative predictor of glycemic control in the Hungarian sample but on the samples from Romania and the U.S., perceived autonomy support came not as a predictor for glycemic control results are obtained according to the theory SDT. Perceived competence was a significant negative predictor of glycemic control in all three samples, the results thus supporting statements theory SDT.

Chapter 6.
Conclusions

The study of **cognitive and motivational correlates of diabetes** has proposed a critical analysis, but also the enrichment of the theories and empirical data on the risk posed by cognitive impairment among people with diabetes and motivational components of diabetes, which is an important variable for appropriate self-management in complications prophylaxis. The whole thesis is presented in two parallel planes, all analyzes were performed separately for both types of diabetes (type 1 and type 2), where we considered appropriate and making comparisons between them.

Central issue of the thesis is organized around the contradictions arisen on the relationship between diabetes and **cognitive impairment,** neuropsychological results of different

studies being heterogeneous in terms of affected cognitive domains and the severity of the damage. Cognitive disorders play an important role in diabetes for two reasons, being a complication associated with the disease, but having a major impact on the quality and the evolution of the disease, affecting self- management.

The second part of this paper proposed to identify and explore the **motivational factors**, pursuing to determine the factors that may play a role in the behavior of patients to maintain health, so that we can define some characteristic sizes of the group, needed for a proper self-care.

Summarizing the most important results obtained in this thesis, we consider that :

According to the overall results, there is a modest but still significant difference between diabetic patients and non-diabetic control subjects, in terms of cognitive performance. For all cognitive domains of the two types of diabetes measured in this study we did not find significant differences. However, the pattern of cognitive dysfunctions in the two types differ, the cognitive dysfunctions subareas showing detectable differences, and if we analyze separately the cognitive areas, cognitive deficiencies are more pronounced in type 2 diabetes than in type 1.

Our results highlight that the constant cognitive reductions manifest in psychomotor activity, verbal memory and delayed memory and some cognitive functions are not affected by glucose imbalances, noting visual memory, general memory, working memory and attention. In type 1 diabetes the most affected area is psychomotor activity and in type 2 diabetes the most affected areas are verbal short-term and long term memory, delayed memory and psychomotor activity.

Translated instruments (DKQ -24 and the package of SDT questionnaires) have good psychometric properties and thus can be used in future studies. With some exceptions, we succeeded to replicate the structure of the original studies. The results on the applicability and the value of the diagnosis and the differentiation of WMS -R scale (Wechsler Memory Scale-Revised) are confirmed.

According to our results we can say that a knowledge of disease (knowledge) alone is not sufficient to achieve a good glycemic control. Knowledge does not always result in an adequate self-management behavior, in order to obtain a good metabolic control.

To explore the motivational factors we applied the SDT model of health (relationship → autonomy → competence → glycemic control), but our data do not fit in all respects to those of the original model from the U.S., being unable to reproduce the exact structure of the original model. To the model from Romania, in both types of diabetes, the order of the two components, namely autonomy and competence, reversed (relationship→competence →autonomy → glycemic control).

According to self-determination theory (SDT), the three basic psychological needs (competence, relationships, autonomy) are universal. However, the significant variability values and objectives may vary among cultures. Our results indicate that factorial structure of motivation and self-adjustment motivational strategies are largely similar in the three groups studied (Romania, Hungary, USA), but there appear to be some differences in the meaning and / or the effect of some constructs.

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