Consideration of Future Consequences, Diabetes Management Self-Efficacy and Medication Adherence of individuals with Type 2 Diabetes

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The present research investigated the effect of temporal decision and diabetes management self-efficacy on medication adherence of individuals with type 2 diabetes. It was hypothesized that individuals with high consideration of future consequences are likely to adhere to diabetic medication. Correlational research design was used. The sample comprised of 143 individuals with type 2 diabetes. Consideration of Future Consequences-14 Scale (Strathman, Gleicher, Boninger, & Edwards, 1994), Diabetes Management Self-Efficacy Scale (Bijl, Poelgeest-Eeltink, & Shortridge, 1999) and Morisky Medication Adherence Scale (Morisky, Green, & Levine, 1986) were used. Data was collected through purposive sampling technique. The results indicated that consideration for consequences (immediate & future) were differentially correlated with domains of diabetes management self-efficacy and medication adherence. Further, all domains of diabetes management self-efficacy showed positive relationship with adherence. Consideration of future consequences predicted adherence to Diabetic medication. Findings suggest that temporal orientation plays an important part in an individual's medication adherence in Type 2 diabetes.

Keywords: consideration for future consequences, self-efficacy, medication adherence, type 2 diabetes

Diabetes mellitus (DM) is a malfunction of pancreas wherein the human pancreas is unable to manufacture adequate insulin and/or the body has problem using insulin. DM is a chronic and progressively degenerative disease. Being chronic and multifaceted in nature, DM requires life-long life style management, commitment and adherence (American Diabetic Association [ADA], 2019). Due to its longevity, coupled with delayed onset of complications, adherence to medication of DM could prove tricky. Any deliberate human endeavor stems from consideration of future consequences i.e. the pros vs cons/ cost benefit analysis along the axis of time (Hall & Fong, 2007). Diabetes management self-efficacy is an individual's goal-driven motivation, i.e., the belief in one's ability of being capable enough to take necessary steps to keep diabetes in check (Dehghan et al., 2017). The objective of the study was to investigate the role of temporal decision making in terms of adherence to Diabetic medication while controlling for Diabetic management self-efficacy in line with the construct of ego-depletion.

Effective diabetes management requires adhering to lifestyle choices which necessitate foregoing of immediate pleasures e.g. sugary, fatty food in favor of activities with no immediate pleasure e.g. exercise, bland food. However, research suggests that people are more attracted to tasks which have immediate positive consequences (van Beek et al., 2013; Davis et al., 2010). Therefore, it is safe to assume that either people are oblivious to the long-term effects of their choices or are more concerned with the immediate gains from their endeavors. To this effect, Dassen et al. (2016) found that, among 146 participants, those individuals who report healthy eating were more likely to continue to do so based on their

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future consideration of consequences of diet and those prioritizing immediate snacks and unhealthy foods were found more concerned not with the future consequences of their food intake habits but rather with the immediate gratification from snacks and unhealthy foods. Similarly, Trope and Liberman (2003) reported that individuals with future orientation are more likely to do so because they value future rewards more favorably than immediate rewards. Joireman et al. (2012) examined individuals scoring high on consideration of future consequences (CFC) and their results suggested that healthy behaviors e.g. healthy eating, medication adherence, exercise etc., which are indicative of diabetes management, are more likely to be adopted by those with a future orientation. Optimal diabetes management requires sustained effort on various facets of life which necessitates improved diabetes management self-efficacy.

Montague et al. (2005) maintain that managing type 2 diabetes is an uphill task which usually necessitates sticking to a multifaceted regimen that requires frequent adjustment of oral medications and insulin along with adhering to the routine day in and day out. Being adherent to the core is a crucial aspect of diabetes management. Adherence in the long run requires strong self-efficacy as without it, it would be increasingly difficult to keep the adverse effects of progressive diabetes at bay e.g. Diabetic Neuropathy (Pop-Busui et al., 2017), Diabetic foot ulcer (Zhang et al., 2017) and Diabetic muscular atrophy (Perry et al., 2016).

Bandura (1977) in his pivotal social cognitive theory proposed the construct of self-efficacy. He proposed that behaviors are a product of incentives and expectancies and are therefore, explainable and predictable. Incentives could be any subjective value associated with a desired outcome or an object. As perceived by the individual, behaviors are controlled by their consequences. Behavioral expectancies are divided into three categories: 1) outcome expectancies (the manner in which behavior is expected to influence results); 2) situational outcome expectancies (how events will take their course without personal sway); and 3) self-efficacy outcomes (belief in one's personal inability to execute an action to attain a desired result). For instance, an individual who values the possible effects of altering his/her food intake (incentive) might attempt to bring about a change in his/her diet due to the belief that his/her present food intake habits might be detrimental to his/her valued notion of looking attractive or being healthy (situational outcome expectancies) and believe that alteration in food intake will decrease these dangers (outcome expectancies), and that he/she has the capacity to adopt to new dietary intake pattern (self-efficacy expectancies). Outcome expectancies and self-efficacy work in together and influence adaptive health related behaviors, sticking to change, and shedding negative habits. As self-efficacy plays a major role in carrying out behavioral change, outcome expectancies are pivotal in fabricating intention to change (Damayanti et al., 2018).

Theory of self-efficacy states the belief that personal capabilities are likely to predict behavioral performance in a particular manner. As for diabetes self-management, self-efficacy for an individual with diabetes creates a sense of confidence in him/her that they can execute self-management activities. With optimal diabetes self-management through increased self-efficacy, it is easier to predict adherence to Diabetic regimen. Diabetic adherence indicates a segment of overall diabetes self-care. Adherence can be understood as closely following the advice of a health care professional; this includes advice pertaining to medications, lifestyle changes e.g. losing weight or quitting smoking, as well as recommendations about preventive measures about avoiding fatty foods or starting an exercise program (McGovern et al., 2018).

Health psychologists have approached the issue of adherence by seeking to identity factors that predict adherence with different aspects of a treatment regimen. Research indicates that socio-demographics, economic, psychological, and environmental factors are

directly and indirectly associated with diabetes control and health outcomes (Gonzalez-Zacarias et al., 2016). Many health enhancing behaviors such as engaging in vigorous exercise and pursuing low-fat diet are either less pleasurable or more effortful than less healthy alternatives. Social and environmental circumstances also factor in poor adherence, as is the complexity of a lifelong regimen of self-care. During periods of unusual stress or social pressure to behave in unhealthy ways, for instance, dietary and exercise adherence often decreases among individuals with diabetes (Vasant et al., 2017).

Adherence is achievable with consideration for future consequences fueling Diabetic self-efficacy to initiate and sustain lifestyle changes. Different theoretical models have explained DM and adherence which argue the intention-behavior route. Temporal self-regulation theory (Hall et al., 2018) attempts to explain type 2 diabetes adherence in terms of consideration for future consequences and temporal valuations wherein self-efficacy is seen as a moderating factor leading to adherence. diabetes is manageable to the extent individuals believe it is, i.e., diabetes management self-efficacy plays an important role in the outcome of diabetes adherence (Reisi et al., 2016).

Purpose of the Study

Diabetes prevalence globally in general and particularly in Pakistan is on the rise. It is estimated that in Pakistan, 7% of the total population is diagnosed with diabetes that is more than eighty-seven thousand people (Aamir et al., 2019). Every 1 in 10 deaths worldwide is linked to diabetes. The average annual cost of diabetes expenditure worldwide exceeds five hundred billion dollars (IDF, 2013). Therefore, the need to study Diabetic adherence is paramount. Previous health theories including Health Belief Model (Rosenstock, 1974) and Theory of Reasoned Action (Ajzen & Fishbein, 1980) held that adequate diabetes education would result in better adherence to medical advice; assuming that all humans are evolutionary programmed to survive.

The reasons for diabetes non-adherence are not well studied and neither is the underlying cause of adherence vs. non-adherence is rigorously examined. The literature review lacks human component of decision making in regards to lifestyle choices necessary to make the required changes in individuals with type 2 diabetes. It would be interesting to understand the decisions individuals with chronic type 2 diabetes make in diet, medicine, and lifestyle. It might be of further academic value to examine the consequence of present/future consideration in individuals with diabetes and its effect on adherence. This might be able to help further the field of diabetes management strategies in Pakistan.

Objectives of the Study

- To understand the relationship between temporal decision making in medication adherence.
- To examine the role of perceived self-efficacy in medication adherence.

Hypotheses of the Study

- There would be relationship between consideration for future consequences (future, immediate), diabetes management self-efficacy (sugar, diet, medicine, exercise and foot care), and Medication adherence in individuals with type 2 diabetes.
- Consideration for future consequences and diabetes management self-efficacy would to predict medication adherence in individuals with type 2 diabetes.

Method

Research Design

This is a correlational study. This design was used to examine individuals with type 2 diabetes on consideration for future consequences, diabetes management self-efficacy, and medication adherence.

Sample

Purposive sampling technique was used to collect sample of 143 (85 men and 58 women) low income individuals with type 2 diabetes. Participants aged 20-70 years with a mean age of 45 years were recruited from out-patient departments of diabetes/ endocrinology of Sir Ganga Ram Hospital and Jinnah Hospital, Lahore. Individuals diagnosed with type 2 diabetes for at least 1 year and individuals able to understand Urdu language were included in the study. Pregnant women with diabetes were excluded owing to possibility of gestational diabetes. Individuals with type 1 diabetes were excluded.

Assessment Measures

Assessment was based on demographic information sheet and three questionnaires.

Demographic Information Sheet

A form was formulated to elicit pertinent demographic information from individuals with type 2 diabetes. The information included participant's age, gender, education, income, duration of diabetes, residence, number of children, other individuals with diabetes in family, if any, and annual physician visitations, type and quantity of medicine taken, and insulin usage, if any.

Consideration of Future Consequences-14 Scale ([CFC-14]; Strathman, Gleicher, Boninger, & Edwards, 1994)

This scale was developed to measure immediate vs. non-immediate consideration of future consequences. It is a 14-item instrument. It consisted of 2 subscales; Future subscale and Immediate subscale. It is a 7-point Likert scale from not like you at all=1 to very much like you=7. The Cronbach's Alpha value for the questionnaire was .85 (Strathmanet.al, 1994).

For the current study, the scale was translated into Urdu language by following MAPI guidelines. Forward and backward translation procedure was followed. The reliability for the current study was found to be .74 and .82 for immediate consequences and future consequences respectively.

Diabetes Management Self-Efficacy Scale ([DMSES]; Bijl & Shortridge-Baggett, 1999)

It is a self-administrating instrument employed to assess the diabetes management self-efficacy. It has a summating rating scale which consists of 20 statements pertaining to diet, level of physical activity, medication, foot care, and blood-sugar testing. The scale is rated 0 (can't do at all) to 10 (certain can do). As it is possible that self-efficacy in one domain might differ from the other, factor analysis was run to reveal five clusters (Bijlb, Shortridge-Baggettc, Astı, & Erguney, 2006) which revealed that the 20 items were clustered into the following five subscales: diet or nutrition self-efficacy—representing the person with diabetes's confidence in carrying out tasks for formulating meal plans; exercise self-efficacy—representing self-efficacy correlated to carrying out physical exercise; blood sugar testing and control— reflecting self-efficacy correlated to monitoring and control of blood sugar levels; foot care self-efficacy—representing self-efficacy to carry out tasks of

examining and inspecting feet for any changes such as cuts; and medical treatment self-efficacy—representing self-efficacy correlated to tasks like taking medication and taking care of their health. The reported internal consistency of the total scale was α=.81 and test–retest reliability was acceptable .79 (Bijl et al., 1999).

For the current study, the scale was translated into Urdu language by following MAPI guidelines. Forward and backward translation procedure was followed. The reliability for the current study was found to be .94. For subscale of sugar, diet, medication, exercise, and foot care, the reliability was .79, .89, .88, .82, .75 respectively.

Morisky Medication Adherence Scale ([MMAS-8]; Morisky* et al., *1986)

The scale was used to measure medication adherence. It consisted of 8-items. It is a generic adherence scale. The response categories are "yes" or "no" for item 1-7 and a 5 point-Likert response for item 8. Item 5 and 8 have reverse codes. The sum of all the eight items of the scale is 8. Ranges are given for low (less than 6), medium (6-8), and high (8) adherence. Alpha reliability for this scale was .83 (Morisky et al., 2008). Urdu translated version was provided by Dr. Morisky. For the current study, the reliability was found to be .69.

Procedure

Permissions were taken from Institute of Diabetes and Endocrinology at Sir Ganga Ram Hospital and Jinnah Hospital, Lahore. Both CFC and DMSES scales were translated in Urdu language adhering to MAPI guidelines. Forward translations followed by a consolidated final forward translation which was then back translated into English language by 3 other researchers. A final translation was agreed upon after due deliberation. The self-administered questionnaire took around 30-45 minutes on the average. After data cleaning, responses from 143 participants were retained. The researcher gathered data from aforementioned public hospitals during outpatient department timings i.e. 9 AM to 2 PM, Monday to Friday. The researcher approached prospective participants as they waited in the lobby for their turn. A large amount of data was deemed unusable as participants left their questionnaires unfinished upon being called upon for doctor consultation. The data was collected from low-income individuals. A sizeable number of participants were elderly individuals and otherwise who had difficulty in reading but not responding to questionnaire items. Therefore, the researcher read out the items to them and the participants orally rated the statements. Data was entered into SPSS and statistical analyses were conducted.

Ethical Considerations

- Prior permission of the questionnaires being used was sought from the respective authors.
- Consent was obtained from participants and they were briefed about the research.
- Anonymity of the participants and confidentiality of the data was maintained.

Results

Cronbach alpha was computed to ascertain reliability of each scale and Pearson product moment correlation was used to examine relationship between consideration of future consequences, diabetes management self-efficacy, and medication adherence. Hierarchical regression analysis was used to examine controlled impact of demographic and clinical variables.

Primarily, it was hypothesized that individuals with high consideration of future consequences are likely to adhere to Diabetic medication and that consideration of future consequences and diabetes management self-efficacy would predict medication adherence.

Table 1

Descriptive Statistics and Intercorrelation among Consideration of Future Consequence, Diabetes Management Self-Efficacy, and Medication Adherence

Variables	2	3	4	5	6	7	8	*M*	*SD*	*α*
1.CFC-Immediate	.13	-.23**	-.24**	-.28***	-.18*	-.30***	-.42***	25.97	6.65	.74
2.CFC-Future	-	.57***	.50***	.64***	.32***	.58***	.50***	32.11	6.34	.82
3.SE-Blood	-	-	.72***	.78***	.59***	.73***	.60***	9.10	2.59	.79
4.SE-Exercise	-	-	-	.69***	.62***	.60***	.51***	11.83	3.56	.82
5.SE-Diet	-	-	-	-	.55***	.70***	.52***	25.22	6.19	.89
6.SE-Foot	-	-	-	-	-	.48***	.37***	5.86	1.82	.45
7.SE-Medi	-	-	-	-	-	-	.60***	6.85	1.84	.88
8.Medi Adhere	-	-	-	-	-	-	-	39.05	16.98	.69

Note. N=143, inter-correlations for sample (n = 143) 1-cfcimmediate= consideration for immediate consequences;2- cfcfuture= consideration for future consequences; 3- dmsesblood= diabetes management self-efficacy blood; 4-dmsesexercise= diabetes management self-efficacy exercise; 5- dmsesdiet= diabetes management self-efficacy diet; 6- dmsesfoot= diabetes management self-efficacy foot; 7 - dmsesmedi = diabetes management self-efficacy medication; 8-medadh= morisky medication adherence scale.

*p <.05, **p <.01. ***p<.001.

The results revealed that consideration for immediate consequence was significantly and negatively correlated with blood, exercise, diet, foot care and medication domains of diabetes management self-efficacy and adherence. Consideration for future consequence was found to be significantly and positively correlated with blood, exercise, diet, foot care and medication domains of diabetes management self-efficacy and medication adherence. It was also found that domains of diabetes management self-efficacy (blood, exercise, diet, foot care and medication) were significantly and positively correlated with adherence.

Furthermore, Hierarchical regression analysis was used to examine consideration for future consequences and diabetes management self-efficacy as predictors of adherence after controlling demographic variables. The results presented in table 2.

Table 2

Hierarchical Regression Analysis Predicting Medication Adherence

	Medication Adherence	
Predictor	ΔR^2	β
Step 1	.007	
Control Variables*		
Step 2	.18***	
Consideration for immediate consequences		-.14*
Consideration for future consequences		.22**
Diabetes management self-efficacy		-.24**
R^2	.43***	
F	6.85***	

Note. N=143, Control Variables* = age, gender, education, marital status

*p<.05, **p<.01, ***p<.001

After controlling demographic variables in step1, consideration for immediate consequences, consideration for future consequences, and diabetes management self-efficacy were entered in step 2. Overall model explained the 43% of variance for medication adherence with F (6, 175) = 6.85, p =.000. Consideration for immediate consequences and diabetes management self-efficacy significantly and negatively predicted medication adherence while consideration for future consequences was found significant and positive predictor of adherence.

Discussion

Literature and cultural perspective are consistent with the present study findings. Present study examined the relationship between consideration of future consequences, diabetes management self-efficacy and medication adherence among individuals with type 2 diabetes.

Results revealed that consideration for immediate consequences fall in line with factors examined. Increased consideration for immediate consequences (CFC-I) would hinder long term adherence. Hall and Fong's (2007) Temporal Self-Regulation Theory (TST) posits that the construct of CFC maybe considered as a relatively stable personality characteristic. Individuals with an immediate orientation are more likely to discount the effects of non-adherence to Diabetic regimen in favor of proximal benefits. In line with this theory, Joireman et al. (2012) discussed the possibility of CFC as being personality traits which may predict the type of future orientation an individual may possess. Medication adherence might be particularly weak among individuals who have a general disposition to evaluate health behaviors according to their short- rather than long-term consequences, referred to as being low in consideration of future consequences (CFC-F). diabetic s low in CFC have been found to be significantly less likely to engage in a variety of health behaviors including physical activity, diabetes screening, and vaccine acceptance and are more likely to have decreased self-care behavior e.g. medication adherence (Beenstock et al., 2011). Adams (2012) reported that consideration of immediate consequences is an important determinant of decreased health-related behaviors than consideration of future consequences. Adams (2012) also found that people with high consideration of immediate consequences are more likely to have higher BMI, thus indicating decreased self-efficacy in terms of diet and exercise whilst also pointing towards decrease medication adherence. Dassen, Houben, and Jansen (2016) found participants high on future orientation were more likely to adhere strictly to healthy eating i.e., self-care (food). People high on consideration for immediate consequences are less likely to involve in self-care behaviors (Lewis et al., 2018).

Self-efficacy in the long run can run out leading to decreased adherence. According to temporal self-regulation theory (Lewis et al., 2018), the lack or presence of self-efficacy is paramount in predicting adherence. Enzler (2015) state that perceptions of treatment effectiveness, control and self-efficacy give an indication of how well individuals with diabetes will be able to deal with the potential health threat of diabetes. It can be summed up that consideration for future consequences is a paramount factor in adherence and non-adherence. The current study is an extensive, detailed and elaborative account of the reasons for non-adherence among individuals with type 2 diabetes in Punjab.

Limitations and Suggestions

- The sample was recruited from a limited pool of populace representing the less-privileged faction of society only. It is suggested to also include other socio-economic strata into the study.
- It was difficult for the researcher to communicate effectively with certain participants e.g. the elderly.
- The current research examined a large age cohort. Future researchers may benefit from collecting data from a narrower age bracket e.g. 30-40 years, or 50-60 years to account for cohort differences.

Implications

- Individuals with diabetes could benefit from understanding the causes of non-adherence and examine how and where the process break down and for what reasons.
- This also sheds light on other chronic ailments where adherence is of pivotal importance.
- The study also emphasizes important implications in treatment or counseling of Diabetic patients.

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