

Impact of Illness Perceptions and Health Hardiness on Diabetes Self-Management among Type 2 Diabetes Patients

A thesis submitted during 2018 to the
University of Hyderabad in partial fulfilment of the award of a
Ph.D. degree in Psychology in the Centre for Health Psychology

by

Chelli Kavya

Registration No. 13CPPH04



**Centre for Health Psychology
School of Medical Sciences**

University of Hyderabad
Central University Campus P.O.
Gachibowli, Prof. C.R. Rao Road
Hyderabad – 500 046, Telangana, India

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Supervisor

Dr. Meera Padhy



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School of Medical Sciences**

University of Hyderabad
Central University Campus P.O.
Gachibowli, Prof. C.R. Rao Road
Hyderabad – 500 046, Telangana, India

DECLARATION

I, Chelli Kavya, hereby declare that this thesis entitled “*Impact of illness perceptions and health hardiness on diabetes self-management among Type 2 diabetes patients*” submitted by me under the guidance and supervision of Dr. Meera Padhy is a bonafide research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or Institution for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodganga/INFLIBNET.

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(Dr. MEERA PADHY)
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CERTIFICATE

This is to certify that the thesis entitled “*Impact of illness perceptions and health hardiness on diabetes self-management among Type 2 diabetes patients*” submitted by Chelli Kavya, Senior Research Fellow, RGNF, bearing Registration Number 13CPPH04 in partial fulfilment of the requirements for award of Doctor of Philosophy in Psychology in the Centre for Health Psychology under School of Medical Sciences is a bonafide work carried out by her under my supervision and guidance.

The thesis is free from plagiarism and has not been submitted previously in part or in full to this or any other University or Institution for award of any degree or diploma.

Further, the student has the following publications before submission of the thesis for adjudication and has produced evidence for the same in the form of the reprint in the relevant area of her research.

1. **Chelli, K.**, Lalnuntluangi, R., & Padhy, M. (2017). Health hardiness and illness perceptions in Type 2 Diabetes Patients. *Journal of Indian Health Psychology*, 12(1), 24-35. (ISSN: 0973-5755). Part of its appears in Chapter II & V of this thesis.
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and

has made presentations in the following conferences:

1. National Seminar on *Wellbeing across Lifespan* held on 25-27 October 2017 at University of Hyderabad, Hyderabad, India (National)

2. National Seminar on *Health Psychology: Contributions to Health and Wellbeing* held on 4-6 August 2016 at University of Hyderabad, Hyderabad, India (National)

3. 51st National and 20th International Conference of the Indian Academy of Applied Psychology (IAAP) held on 6-8 May 2016 at Bengaluru, India (National & International)

4. National Conference on *Caring the Elderly: Psycho-Social Perspectives* held on 23-24 March 2016 at Pondicherry, India (National)

5. *XXIII Annual Convention of National Academy of Psychology (NAOP)* held on 13-15 December 2013 at Rourkela, India (National)

Further, the student has passed the following courses towards fulfilment of coursework requirement for Ph.D.

Course Code	Name	Credits	Pass/Fail
1. HP 826	Theory Paper I*	4	Pass
2. HP 827	Book Review Paper II	4	Pass
3. HP 828	Review Paper III	4	Pass
4. HP 829	Empirical Paper IV	4	Pass

*Research Methodology and Advanced Statistics

Supervisor

Head of the Centre

Dean of the School

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(CHELLI KAVYA)

ABSTRACT

Type 2 diabetes is one of the leading non-communicable diseases in India. Management of the condition is multidimensional, cornerstone to a better glycemic control, and a lifelong process. Diabetes self-management constitutes of various elements ranging from regular checkups, blood glucose testing to following dietary recommendations. Each of these aspects are influenced by various personal factors (beliefs, attitudes, knowledge about the illness, culture/ethnicity/language, co-morbidities, financial resources, and social support) and factors relating to health provider (patient-provider communication, health care system, and beliefs and attitudes of the physician). It is essential to assess and explore such factors, so as to modify aspects that hinder the management of illness. Hence a mixed methods sequential explanatory study was conducted with the following objectives: (1) to assess the level of illness perceptions, health hardiness, and diabetes self-management among Type 2 diabetes patients (2) to examine the relationship between demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions, health hardiness and diabetes self-management among Type 2 diabetes patients (3) to examine whether demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions and health hardiness predict diabetes self-management among Type 2 diabetes patients and, (4) to explore the lived experiences of Type 2 diabetes patients for understanding the facilitating factors and barriers to diabetes self-management. This study was carried out in two phases. Phase I (quantitative approach) utilized cross-sectional survey design and phase II (qualitative approach) was informed by interpretative phenomenological analysis. The sample size in phase I was 286 (50.7% men and 49.3% women) individuals with Type 2 diabetes. In phase II, ten

participants were selected (five with low and five with high diabetes self-management scores) after the analysis to explore the various factors influencing diabetes self-management. The sample was recruited from diabetes clinics and diagnostic centers in Hyderabad, India. Following questionnaires were administered to participants: Revised Illness Perception Questionnaire, Revised Health Hardiness Inventory (RHHI-24), Diabetes Self-Management Questionnaire and demographic form. The data collected in phase I were analyzed using descriptive (frequencies and percentages) and inferential statistics (Person correlation and hierarchical multiple regression). Phase I results showed that loss of strength and fatigue were highest reported symptoms related to diabetes by participants. Both positive and negative significant correlations were observed between demographics, illness perceptions, health hardiness, and diabetes self-management. Illness perceptions, components of health hardiness and demographic variables explained significant proportion of variance in overall diabetes self-management and its components. Hereditary and stress were highest agreed causes of diabetes. Certain misconceptions regarding the cause of diabetes were observed which need attention. Phase II data were analyzed using thematic analysis. Following aspects— belief system, support from family members, persistent care, knowledge about diabetes, and wish for a healthier future emerged as ‘facilitating factors’ to diabetes self-management whereas aspects such as social constraints, lack of informational support from physician, poor health value and presence of comorbid conditions emerged as ‘barriers’. The results indicated the need for psychosocial interventions to help the patients overcome the barriers to their diabetes self-management and dispelling the misconceptions. The limitations and implications of the study are discussed.

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ABBREVIATIONS

BMI	:Body mass index
CHD	:Coronary heart disease
CSM	:Common-sense model of self-regulation
CVDs	:Cardiovascular diseases
DAWN	:Diabetes Attitudes, Wishes and Needs survey
DSMQ	:Diabetes self-management questionnaire
EHLOC	:External Health Locus of Control
HbA1c	:Glycated hemoglobin
HRH	:Health-related hardiness
IDF	:International Diabetes Federation
IHLOC	:Internal Health Locus of Control
IPA	:Interpretative phenomenological analysis
IPQ-R	:Revised illness perception questionnaire
NCDs	:Non-communicable diseases
RHHI-24	:Revised health hardiness inventory
SMBG	:Self-monitoring of blood glucose
TOTE	:Test, operate, test, exit
WHO	:World Health Organization
YLDs-	:Years lived with disability

CHAPTER I

INTRODUCTION

Non-communicable diseases (NCDs) or chronic illnesses are at rise across the globe. NCDs disproportionately affect individuals belonging to various backgrounds and are observed to cause numerous deaths worldwide. Major types of NCDs are chronic respiratory diseases, cardiovascular diseases (CVDs), diabetes, and cancer. The healthcare cost due to NCDs was observed to increase and the quality of life was observed to decrease.

Diabetes is a chronic metabolic disorder characterized by abnormally higher levels of blood glucose. Diabetes is classified mainly as Type 1 and 2. In Type 1 diabetes enough insulin is not produced by pancreas whereas Type 2 diabetes is marked by insulin resistance (failure of body cells to respond to insulin properly). Type 1 diabetes was previously referred to as “insulin dependent diabetes mellitus” whereas Type 2 diabetes as “non-insulin dependent diabetes mellitus”. A third type known as gestational diabetes, develops only during pregnancy (with no history of diabetes in past). Treatment for diabetes includes multiple aspects. The primary aim of the treatment is to obtain optimal blood glucose and lipids levels and maintain these with the purpose of preventing or delaying the onset of diabetes-related complications (American Diabetes Association, 2010).

Prevalence of diabetes

Diabetes is a major non-communicable disease accounting for the increased prevalence of morbidity and mortality among the Indian population as well as worldwide. World Health Organization (WHO) reports that the number of people living with diabetes is increasing across the world (World Health Organization, 2011). It is predicted that diabetes might become twofold globally from 171 million (in 2000) to 366 million cases by 2030 and the maximum increase is likely to be in India (Wild, Roglic, Green, Sicree, & King, 2004). As per the estimates of WHO (2016), 422 million individuals over 18 years were suffering from diabetes in 2014 worldwide. As per the reports by International Diabetes Federation (IDF), nearly 415 million individuals had diabetes in 2015 and by the year 2040 this figure is likely to rise to 642 million and seventy-five percent of individuals were residing in low income and middle-income countries (Ogurtsova et al., 2017). As per WHO report, India is heading the world with 32 million diabetic cases and this figure is projected to rise to 79.4 million by 2030 (Mohan et al., 2005; Whiting, Guariguata, Weil, & Shaw, 2011). Surveys reveal that diabetes affects 5-8% of the rural population and 10-16% of the urban population in India (Wild et al., 2004; Pradeepa & Mohan, 2002).

In India the prevalence of diabetes range from five to seventeen percent with higher levels observed in southern part and urban areas of country (Ramachandran et al., 2001; Mohan et al., 2006; Ajay et al., 2008; Ravikumar et al., 2011; Little, Humphries, Patel, Dodd, & Dewey, 2016; Barik, Mazumdar, Chowdhury, & Rai, 2016). Similarly National Urban Survey including some metropolitan cities in India revealed same trend—Kolkata (11.7%); Kashmir Valley (6.1%) (Zargar et al., 2000) and New Delhi (11.6 %);

Mumbai (9.3 %); Bangalore (12.4 %), Hyderabad (16.6 %), and Chennai (13.5 %) (Ramachandran et al., 2001). Another study revealed that approximately half of the individuals with diabetes in India have poor glycaemic control and that Type 2 diabetes was observed to begin at an early age (Raheja et al., 2001). The global burden of diabetes mellitus is enormous in terms of annual expenditure. With the increasing number of cases annually, diabetes mellitus and other NCD's have become a major focus of healthcare all over the world. WHO (2011) projections indicate that diabetes would be the 7th leading reason for death in the year 2030.

However, estimating the prevalence of diabetes can sometimes be challenging as it is asymptomatic until complications appear. Undiagnosed diabetes and self-reported prevalence (which can be limited by low awareness or recall bias) may not reflect the true burden of the disease. So blood glucose testing is needed to find out the individual's status. Unfortunately, lack of awareness prevents the individuals suffering from diabetes from engaging in healthy lifestyle behaviours and seeking appropriate medical care on time. The cost of diabetes and its care is increasing worldwide in line with its prevalence. The economic burden in developing countries is high, and it is even higher among low economic groups, who tend to spend 25 to 34 percent of their pay on diabetes (Kapur, 2007; Ramachandran et al., 2007).

Symptoms

Type 2 diabetes onset can be gradual and insidious. The symptoms include (1) increased hunger and thirst, (2) frequent urination, and (3) weight loss (Vijan, 2010). Some of the symptoms which might be present during the time of diagnosis include

peripheral neuropathy, blurred vision, itchiness, fatigue, and recurrent vaginal infections (David & Dolores, 2011).

Complications

Poor management of diabetes results in a range of medical complications. These include cardiovascular diseases (heart failure, strokes) (Grundy et al., 1999), eye problems (retinopathy, cataract) (Fong et al., 2004), neurovascular limb diseases (peripheral vascular disease, foot ulcers) (Adler, Boyko, Ahroni, & Smith, 1999), and cognitive disorders and mental health issues (dementia, depression) (Pan et al., 2010; Gudala, Bansal, Schifano, & Bhansali, 2013). Complications also include the risk of cardiovascular diseases (stroke and ischemic heart disease), amputations of the lower limb, and increased hospitalization rates (Melmed, Polonsky, Larsen, & Kronenberg, 2011). Some other complications include frequent infections and sexual dysfunction (Vijan, 2010). These complications can be incapacitating and sometimes fatal making diabetes a major contributor to YLDs-years lived with disability (Lozano et al., 2012).

Prevalence of diabetes complications

According to the Chennai Urban Population Study, 21.4 percent of individuals had coronary artery disease and 6.3 percent had the peripheral vascular disease (Viswanathan, Madhavan, Rajasekar, Chamukuttan, & Ambady, 2006). Another study conducted in South India reported retinopathy (23.7%) and neuropathy (27.5%) as common complications due to Type 2 diabetes (Ramachandran et al., 1999). According to a baseline data from 885 clinical centres, 22.7 and 41.8 per cent of diabetes patients were observed to have some form of macrovascular or microvascular complications

respectively (Das et al., 2012). According to Chennai Urban Rural Epidemiological study, the prevalence of microalbuminuria was 26.9 per cent (Unnikrishnan et al., 2007) and peripheral neuropathy was 26.1 per cent (Pradeepa et al., 2008) respectively.

Diabetes burden in India

The economic burden as a result of diabetes in India is amongst the highest in the world. But the real burden due to diabetes is because of a range of complications it has (both micro and macro), which result in increased morbidity and mortality (IDF, 2014). Cost due to diabetes care was observed to rise over the years. In India, the overall direct costs due to diabetes doubled between the years 1998 to 2005 (Ramachandran et al., 2007). As per the estimates from 2010, the direct costs were observed, to sum up to US\$ 400-500 (Tharkar, Devarajan, Kumpatla, & Viswanathan, 2010).

Causes of Type 2 Diabetes

Diabetes mellitus continues to escalate as a consequence of rapid socio-cultural changes, which include urbanization, changes in diet, limited or reduced physical activity and health deteriorating behaviours. Recent epidemiological studies indicate an increase in occurrence and prevalence of diabetes among the middle class and working poor in urban India (Mendenhall et al., 2012). Indian population is believed to have a stronger genetic predisposition towards diabetes and a greater degree of resistance to insulin (Mohan, 2004). Some of the contributing factors of diabetes are described below.

Genetics

Genes are shown to play a vital role in the development of diabetes mellitus. The chance of an identical twin developing diabetes within the lifetime is more than ninety per cent, given the scenario of another twin already having it. The rate for non-identical siblings is twenty-five to fifty per cent (David & Dolores, 2011). Type 2 diabetes prevalence was observed to be high in Asian populations, particularly among Asian Indians, due to genetic susceptibility and lifestyle patterns. Consumption of high-fat diet and lesser physical activity levels are the common reasons which trigger the 'gene-environmental interaction'. (Ramachandran, Snehalatha, Shetty, & Nanditha, 2012).

Medical conditions

A range of medications and existing health issues can predispose an individual to diabetes. Individuals with gestational diabetes were found to be at risk of developing this condition (Vijan, 2010). Some of the medications are reported to result in Type 2 diabetes (Izzedine et al., 2005; Sampson, Linton, & Fazio, 2011).

Lifestyle

Lifestyle factors such as lack of physical activity, stress, poor diet, and urbanization are significant markers that increase an individual's risk of suffering from diabetes (Melmed, Polonsky, Larsen, & Kronenberg, 2011; Abdullah, Peeters, de Courten, & Stoelwinder, 2010). Smoking (Pan, Wang, Talaei, Hu, & Wu, 2015) and consumption of excessive drinks containing sugar and excessive white rice (Hu, Pan, Malik, & Sun, 2012) are linked with heightened risk of developing this condition. Body mass index (BMI) has been observed to be one of the contributing factors in the

development of diabetes. A study revealed that the risk of diabetes gradually heightens with BMI more than or equivalent to 23 kg/m^2 among Indians (Snehalatha, Viswanathan, & Ramachandran, 2003).

Prevention of diabetes

According to WHO (2016), most of the diabetes cases in the world are Type 2. Though some of the risk factors (genetics, ethnicity, age) of type 2 diabetes are not modifiable, yet some (unhealthy diet, insufficient physical activity, obesity) of them can be modified by making changes to behavior and environment. Among those with high risk of Type 2 diabetes, individual level intensive interventions targeted at improving diet and physical activity are useful in preventing or delaying the onset. Healthy diet and adequate physical activity on regular basis could reduce the risk as well as improve glucose uptake and insulin sensitivity. Research has shown that intensive interventions that modify persons' diet, improve physical activity, and lead to reduced excessive body weight could prevent Type 2 diabetes both in those with (1) impaired glucose tolerance and (2) impaired fasting glucose. It is also true in those without impaired fasting glucose. Individual's self-management, supportive family as well as social network are required for the sustenance of lifestyle modifications that are needed to reduce the risk. Individuals with diabetes could live longer and have healthy lives if the condition is diagnosed and well-managed.

Self-Management of Chronic Illness

Self-management approaches show patients' judgements and values in the context of everyday living and then integration to illuminate how a complete treatment plan can

be decided and executed (Holman & Lorig, 2004). Self-management is the cornerstone of the positive health outcomes in chronic illness patients. It is an approach based on the following concepts: self-regulation, self-control, and self-efficacy (Bandura, 1986; Rosal et al., 2011). The concept of self-regulation refers to a proactive process in which an individual organizes and manages his/her thoughts, emotions and behaviours to attain particular goals (Zimmerman, 2000). In other words, it is an individual's ability to monitor or manage himself/herself. It has been studied in terms of emotional regulation (ability to control one's sentiments and motives) and cognitive regulation (ability to control thoughts and actions associated with planning and execution of behaviours) (Banfield, Wyland, Macrae, Munte, & Heatherton, 2004). Self-regulation comprises of three processes namely (1) self-observation (or self-monitoring), (2) self-judgement, and (3) self-reaction. *Self-observation* is monitoring one's behaviour or deliberate attention to aspects pertaining to one's behaviour. *Self-judgement* is a comparison of present performance with one's goal. And finally *self-reaction*, which is an individual's emotional response related to the behaviour (Rymal, Martini, & Ste-Marie, 2010)

The second concept is self-control. Self-control can be defined as the process of acquiring skills to attain personal control on one's thoughts and actions to accomplish the target behaviour (Bonsaksen, Lerdal, & Fagermoen, 2015; Lawton, Ahmad, Peel, & Hallowell, 2007). Finally the concept of self-efficacy which according to Bandura (1995) "refers to belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (p. 2). In simpler terms, it is people's judgement about their ability to perform certain tasks. A shift has been observed from traditional approaches of managing chronic conditions such as provider-patient

relationship to approaches emphasizing individual role in managing their care in partnership with health-care providers (Holman & Lorig, 2000; Bodenheimer, Lorig, Holman, & Grumbach, 2002). The major focus of self-management is to identify and elaborate the patient centric strategies to deal with the various challenges posed by chronic illnesses (Barlow, Sturt, & Hearnshaw, 2002; Swendeman, Ingram, & Rotheram-Borus, 2009).

Diabetes Self-Management

Individuals suffering from diabetes are required to manage their condition lifelong. Diabetes self-management occurs alongside the medical setting and the daily life involves adherence to various recommended activities. A substantial level of self-management is needed for achieving optimal diabetes control and preventing or delaying the onset of diabetes-related complications.

Self-management involves participating in activities that shield and promote health, observing and managing symptoms, the effect of disease on a day to day functioning, emotional well-being, and social relationships and complying with treatment regimens (centre for advancement of health, 1996). Self-management in relation to diabetes involves attending regular check-ups and adherence to physician-prescribed medication and lifestyle changes (Morowatisharifabad, Mahmoodabad, Baghianimoghadam, & Tonekaboni, 2010; Adriaanse & Bosmans, 2010; Greenhalgh et al., 2011).

The concepts— adherence, self-care or self-management are frequently used interchangeably in psychology literature. Adherence can be defined as an ability of the

individual to follow the healthcare provider's recommendations on treatment regimens (Deaton, 2000). Self-care relates to specific behaviours that are initiated and performed by people themselves with the intent of improving their health, preventing their illness, or maintaining well-being (Orem, 2001). The nature of disease typically determines the self-care behaviours that individuals adopt. Self-care behaviours are generally prescribed by healthcare professionals and are usually explained in terms of individual's adherence. Some authors consider patients' involvement in their self-care as self-management (Ekman et al., 2005). Self-management goes further than merely following instructions. It involves teaching patients to (1) monitor their symptoms (2) make decisions, and (3) evaluate the effect of such decisions (Shuldham, Theaker, Jaarsma, & Cowie, 2007). Self-management is considered as cognitive decision towards symptoms and theorized as a process involving phases from novice to expert (Deaton, 2000). In this chapter the terms self-care, adherence and compliance are used along with diabetes self-management. Major components of diabetes self-management are discussed below.

Medication Adherence

Adherence to medication is crucial in the management of any type of chronic diseases. Adults with Type 2 diabetes are often prescribed several medications for hyperglycaemia, and also for associated conditions like hypertension and other comorbidities (Kirkman et al., 2015). In individuals with diabetes, medication adherence is related to better control of intermediate risk factors (Bogner, de Vries, O'Donnell, & Morales, 2013), lower odds of hospitalization (Juarez, Tan, Davis, & Mau, 2013), lower health care costs and lower mortality (Hong & Kang, 2011).

Monitoring of Blood Glucose

Regular monitoring of blood glucose levels helps patients in adjusting to diabetic medication and warns them when glucose levels go extremely high or low (American Diabetes Association, 2007). Self-monitoring of blood glucose (SMBG) refers to an approach towards glucose monitoring that informs patterns of glycaemic level all through the day (Parkin, Hinnen, & Tetrack, 2011). Particularly it increases awareness of the patient regarding hypoglycaemia (Schnell et al., 2009) thus provides a possible preventive strategy to activate self-regulation of hypoglycemic episodes (Peel, Parry, Douglas, & Lawton, 2004).

The practice of SMBG is not widely observed in the Indian context. Numerous western studies have reported the use of SMBG. A study conducted by Krishnan and Thirunavukkarasu (2016) reported that only 24.1 percent of Type 2 diabetes patients had adequate knowledge of self-blood glucose monitoring and indicated the need for awareness in population. Their study also reported that nearly half of the patients in the study were not taught self-blood glucose monitoring by the physicians, instead patients reported learning from paramedical professionals, friends and relatives.

Dietary Management

Diet is an integral part of diabetes management. Various aspects effect glycaemic response to food, such as amount of carbohydrates (Gannon, Nuttall, Westphal, Fang, & Ercan-Fang, 1998), type of sugar (Wolever et al., 1994), nature of starch (O'dea, Snow, & Nestel, 1981), and food components (Järvi et al., 1995). American Diabetes Association suggested customizing micronutrient needs based upon current patterns of food intake,

preferences and metabolic goals (Evert et al., 2014). Various organizations have recommended limited consumption of beverages which contain sugar for the management of diabetes (Evert et al., 2014). Studies have indicated that in supporting metabolic goals consumption of the type of fat is very crucial than the total intake of fat (Estruch et al., 2013; Evert et al., 2014). To accomplish long-term compliance, individuals are required to have flexibility in choices regarding food without limiting overall diet quality.

Exercise or Physical Activity

Exercise along with medication and diet is also an integral part of Type 2 diabetes management. Regular physical activity has shown to influence both the physiological and psychological parameters of an individual. Physical activity was found to have a positive impact on blood pressure, lipid levels, cardiovascular events, quality of life and mortality (Colberg et al., 2010). Similarly, regular physical activity was shown to favourably affect insulin sensitivity and overall glycaemic control (Nair, 2005; Goodpaster & Brown, 2005; Toledo et al., 2007). Physical activity was shown to play a crucial role in avoiding or delaying diabetes complications for example neuropathy, nephropathy, and retinopathy and could slow the progression of already existing complications (Boulé, Haddad, Kenny, Wells, & Sigal, 2001).

Diabetes self-management is determined by various factors and two such factors are illness perceptions and health hardiness. Both these factors are described below.

Illness Perceptions

A range of theoretical frameworks exists in the field of psychology that explain an individual's health behaviours or actions towards illness. One such significant framework proposed by Leventhal and colleagues is the common-sense model of self-regulation (CSM). As per this model, individuals' who encounter a health threat, and experiencing symptoms are likely to form cognitive as well as emotional representations relating to their condition (Leventhal, Brissette, & Leventhal, 2003). This model is also varyingly known as (1) the illness perceptions model, (2) the parallel process model, (3) the illness representations model, (4) the self-regulatory model or (5) Leventhal's model (Leventhal, Jones, & Tremblay, 1966; Leventhal, Meyer, & Nerenz, 1980; Nerenz & Leventhal, 1983; Meyer, Leventhal, & Gutmann, 1985; Leventhal et al., 1997; Leventhal et al., 2003). In this chapter illness representations and illness beliefs are used along with illness perceptions.

According to Cameron and Leventhal (2003), the concept of self-regulation could be interpreted as a "systematic process involving conscious efforts to modulate thoughts, emotions and behaviours" (p.1). This is a 'dynamic motivational' concept that includes (1) setting goals, (2) planning suitable strategies to attain these goals, (3) assessment of goals and plans, and (4) revision of goals and plans. It follows TOTE principle (test, operate, test, exit).

The common sense model gives a conceptual framework for assessing various processes (i.e. perceptual, cognitive, and behavioural) concerned with self-management of continuing and future health problems (Leventhal, Phillips, & Burns, 2016). This model describes a dynamic and multi-level process which generates a person's

representations of health threats, techniques for management, and a system to make action plans and implement them. This process is usually initiated by the experiences of somatic sensations or deviation from normal functioning (e.g. symptoms) and by observations and discussions about illness (including medical diagnosis). In addition to these, environmental cues and mass media also act as stimuli. These stimuli activate 'prototypes' or 'memory structures' of a person's normal functioning *self*, previous experiences of illnesses as well as various treatments and lifestyle activities. Then they generate mental representations concerning illness threats, that is, beliefs concerning illness identity, cause, consequences, control, beliefs regarding timeline of illness, possible treatments and action strategies (Leventhal et al., 2016).

The research on individuals' perceptions of illness originated from health-threat communication research (Broadbent, Petrie, Main, & Weinman, 2006) and is central to CSM. According to Leventhal and colleagues (1997), illness perceptions refer to set of beliefs regarding an illness and were found to guide management of illness, even if they were medically incorrect (Hagger & Orbell, 2003). In other words, they are an organized pattern of beliefs about the illness which influence the behaviour directed towards management of illness (Petrie & Weinman, 2006). This model provides a basis to understand the way an individual's symptoms and their emotions (as a result of diagnosis) influence their perceptions about illness and direct subsequent coping behaviour (Diefenbach & Leventhal, 1996). Till date, numerous research studies have shown that patients' illness perceptions play a predictive role in coping responses as well as various health outcomes (Hagger & Orbell, 2003; Scharloo et al., 2007; Stockford, Turner, & Cooper, 2007; Dijk et al., 2009).

Self-regulation model postulates that health-related behavioural patterns are the outcome of complex multidimensional representations of illness. It is postulated as parallel processing framework in which one aspect of processing is involved with cognitive processing of stimulus (internal and external) and the other to the processing of emotional aspects associated with that stimulus. One of the significance of the parallel processing is that the health behaviours could be triggered as a consequence of both cognitive plus emotional processes (Leventhal et al., 1992). This model explains both cognitive as well as emotional representations, whereas some of the other models are less successful in highlighting the role of emotional aspects.

Components/dimensions of illness perceptions

Research into illness perceptions suggest that they encompass the following dimensions namely (1) *identity* (label to describe illness as well as symptoms attributed to illness), (2) *timeline* (course and illness duration i.e. acute/chronic/cyclical) (3) *cause* (perceived cause), (4) *consequences* (beliefs regarding impact of illness), and (5) *control* (beliefs about controllability and the recovery) (Leventhal, Brissette, Leventhal, 2003). The first component *identity* is very important to illness behaviour. The presence or experience of symptoms is not enough to initiate the process of seeking help, but labelling is critical in either seeking help or ignoring symptoms. Labels give a framework within which symptoms can be interpreted. It has been seen that individuals experience less emotional arousal when they find a label that indicates a minor problem. The second component is *timeline*. Patients develop timeline beliefs about their illness and these usually range from acute to chronic. Even though the course of illness is implicit within the diagnosis, individual's understanding of time involved may not be accurate. People

with chronic illnesses may view their condition as acute and of shorter duration. For instance, individuals with heart disease (a chronic condition) may view it as heartburn, an acute condition (Martin & Leventhal, 2004). Timeline beliefs have significant associations with adherence to medication. People with acute models of illness are more likely to give up their medication and other treatments before those with more chronic perceptions. Patients also view their illness as cyclical depending upon the nature of illness and symptoms.

The third component is *cause*. Individuals tend to develop causal beliefs immediately after the diagnosis. Causal beliefs are crucial in specific illnesses as they tend to impact individuals decision of seeking help or type of treatment and can influence the changes they adapt to control the illness. For instance, if a person believes that his/her heart attack was due to health deteriorating habits such as smoking or consumption of fatty foods, he/she is more likely to make changes towards these behaviours (Weinman, Petrie, Sharpe, & Walker, 2000). In some illnesses, causal beliefs strongly impact emotional responses especially if the individual blames himself for the illness. The fourth component is the *consequence*. It includes the influence the disease would have on different dimensions of life such as work, finances, family and lifestyle. Sometimes individual's view of consequences regarding their illness might reflect the subjectively perceived severity of illness.

The consequences of illness are implied by the diagnosis. However, an inaccurate understanding of consequences might have a profound effect on illness behaviour. For instance, some people view cancer diagnosis as a death sentence. Women who observe lump in the breast may sometimes delay approaching the physicians not because they fail

to see the symptom of cancer but because of the fear of possible consequences like surgery, chemotherapy, radiation, the possibility of losing breasts and other consequences. The last component is the *controllability*. Generally, control beliefs are developed depending on how the illness is inclined towards personal control and how it can be controlled with treatment. Individuals who believe that their actions will not influence the course of illness are less likely to opt for treatment than those with the belief that quick treatment will be effective. Higher control beliefs are generally linked to shorter timeline perceptions.

Illness perception questionnaire is based on CSM and assesses the components of cognitive illness representation as mentioned above (Weinman, Petrie, Moss-Morris, & Horne 1996). In the revised version of the scale, they categorized control/cure aspect as personal and treatment control. The personal control relates to own control over management and treatment control relates to recommended advice and outcome expectancies of treatment (Moss-Morris et al., 2002). According to them, the timeline dimension is divided into timeline acute/chronic which relates to perceptions regarding length of illness whereas timeline cyclical relates to perceptions regarding the unpredictable and cyclical nature of the illness. The two other aspects emotional representations and illness coherence in the revised questionnaire explore the emotional responses to the condition and overall understanding of illness.

Evidence for the dimensions of illness perception

Both qualitative and quantitative research methodologies have demonstrated that the beliefs regarding illness are formed by different dimensions.

Qualitative research

Leventhal and his colleagues had conducted interviews with chronically ill individuals and healthy adults and the descriptions of illness provided by the participants suggested that underlying beliefs were made up of above-mentioned dimensions.

Quantitative research

Studies conducted by various investigators in past provide support for the dimensions of illness cognitions (Bishop & Converse, 1986; Lau, Bernard, & Hartman, 1989; Lau, 1995). A meta-analysis of various studies that have utilized Leventhal's model of illness cognitions has found support for different illness cognition dimensions and these were found to show a logical pattern across various illnesses (Hagger & Orbell, 2003).

Sources of illness perceptions

The CSM conceptualizes that individuals tend to develop mental representations based on existing concrete and abstract information sources so as to make sense or understand and manage their illness. Interpretation of this information leads to the initial step towards the process of seeking help, participation in coping efforts or the implementation of disease management recommendations (Bishop & Converse, 1986). According to CSM illness representations stem from three basic information sources (Leventhal et al., 1984). In other words, an illness representation tends to be directed by three sources of information. *Lay information* assimilated by a person from previous social communications and culturally based knowledge of an illness, act as the first source of information. The *external social environment* acts as a second information

source which includes perceived significant others (spouse) and authoritative figures (healthcare professionals). Lastly, the representation is completed by taking into consideration the *current experience* with illness. The *current experience* demonstrates symptomatic information created from current perceptions and past experiences with the disease or illness. Knowledge about the effectiveness of coping strategies employed in the past to manage illness also makes a part of the current experience. Hence information derived from these sources guide an individual in making sense of or constructing an illness representation.

Forming illness representation is a two-level process. The process of constructing a representation is symmetrical in nature in which links are created between abstract and concrete information sources (Leventhal, 1990). For example, symptom experience or somatic information may compel an individual to search ‘semantic memory’ for abstract information in order to relate those symptoms with already existing diagnosis or stored labels. Further, the individual is compelled to construct a schematic representation of his or her illness linked to abstract illness label. The resultant schema is derived from concrete evidence and motivates an individual to look for concrete bodily symptoms related to diagnosed illness. This symmetry rule in which symptoms are linked to diagnosis is automatic and intuitive in nature. To summarize, formation of an illness representation results from perceiving and interpreting the information from different sources through symmetrical, conceptual (abstract), and schematic (concrete) processes.

Nature of illness perceptions

The individual, as a common sense scientist, appraises the competency of the coping efforts that are adopted in response to illness and this may result in changes or

adjustments in illness representations, health-seeking approaches and behaviours, or both (Leventhal, Brissette, & Leventhal, 2003). In other words, the process of self-regulation is dynamic in nature as feedback from evaluation of coping efforts impact cognitive representations, emotional responses and future coping efforts. Apart from facilitating efforts towards coping, these representations provide personal meaning to patients' experience of illness and symptoms (Cameron, Leventhal, & Leventhal, 1993).

It has been demonstrated that both cognitive and emotional representations could be triggered and developed at the same time (Cameron & Moss-Morris, 2004; Broadbent et al., 2009). There are two major issues related to illness perceptions. First, the patients' beliefs about their illness may differ from their physician's beliefs and secondly, perceptions are found to vary among patients suffering from similar medical conditions (Petrie, Jago, & Devcich, 2007).

Longitudinal observational studies have shown that patients' views regarding their illnesses are relatively stable (Foster et al., 2008). The development of illness perceptions is influenced by two processes. First, when individuals encounter a health threat they tend to perceive it as acute (can be cured) illness. They expect their illness to get cured or believe that there will be some remedy for it due to their previous experiences with common conditions. However, in the context of chronic illnesses, reality compels the patients to shift from 'acute' illness model to 'chronic' illness model (Leventhal, Nerenz, & Steele, 1984). This shift relates to timeline perceptions of illness i.e. acute versus chronic.

Second, according to researchers the success or failure of treatment procedures tend to shape and reshape illness representations and the treatment could be considered as

a means of coping with the illness (Horne & Weinman, 1998; Leventhal et al., 2003). Patient's illness representations during the post-treatment phase were observed to be affected by the evaluation of the effectiveness of treatment or treatment outcomes. And it has been demonstrated by previous studies that more optimistic representations of illness are associated with a positive appraisal of the outcomes. Evidence for this claim comes from a study done on patients suffering from back pain (Foster et al., 2008). It was noticed that those who were benefited from treatment procedures reported a reduced number of symptoms, consequences and emotional representations than their counterparts and greater personal control, better perceptions of treatment control and illness coherence.

Other components of illness representations were also observed to change over a period of time (Leventhal, et al., 1997). A study had shown that perceptions of chronic timeline were found to increase over time while perceptions of controllability/curability (both personal and treatment) were found to decrease in patients with cardiac conditions (Sheldrick, Tarrier, Berry, & Kinsey, 2006). On the other hand, emotional representations were found to decrease within a span of two years post-diagnosis while illness coherence was found to increase in patients with diabetes (Lawson, Bundy, & Harvey, 2008). Decreased personal control and emotional reaction to illness and increased perceptions about chronicity and illness coherence were reported by patients suffering from osteoarthritis in a 6-year longitudinal study (Bijsterbosch et al., 2009). Summary of studies assessing illness perceptions in various patients groups demonstrates that perceptions of the timeline (chronic) and illness coherence tend to increase with the

progression of time while perceptions of personal control and emotional reactions toward illness tend to decrease.

Evidence have shown differences in illness perceptions in individuals (1) belonging to minority vs. majority race/ethnicity (2) with younger vs. older age (3) having or not having a family history of diabetes (4) performing limited vs. regular physical activity and (5) with low vs. high body mass index (Trief, Wade, Pine, & Weinstock, 2003; Bean, Cundy, & Petrie, 2007; Gosse, 2007; Petriček et al., 2009; Broadbent, Donkin, & Stroh, 2011; Abubakari et al., 2011; Scollan-Koliopoulos, Walker, & Rapp III, 2011). And CSM was found to be applicable to a wide range of diabetic patients irrespective of their cultural, demographic or clinical profile (Nouwen et al., 2009; Abubakari et al., 2011; Abubakari et al., 2013).

Leventhal's self-regulatory model of illness cognitions

The description of illness cognitions has been incorporated by Leventhal into his self-regulatory model of illness behaviour. The model is grounded in the approaches to problem-solving and proposes that individuals tend to deal with illness/symptoms in the similar way as other problems. In the context of a problem, the individual is motivated to deal with problem or change situation and restore their normality state. Problem-solving is explained in three different stages by traditional models. The first stage is *interpretation* in which individual tries to make sense of the problem, second is *coping* where the problem is dealt to re-establish the state of equilibrium and third is *appraisal* stage where coping efforts are appraised for their effectiveness. According to these models, three stages continue until the coping efforts are considered successful and equilibrium is restored. In case of health and illness, if health is equal to the state of

normalcy then the onset of illness can be interpreted as a problem, as a consequence of which the individual will be encouraged to restore the normal state i.e. their health. These stages were applied to health utilizing self-regulatory model.

Hardiness

Kobasa (1979) found that individuals experiencing higher levels of stress without becoming ill possess a personality structure distinct from individuals who become sick under stressful circumstances. This personality characteristic is known as *hardiness* (Kobasa, 1979), and it has its origins in existential personality theory. This characteristic has been recognized as a personality resource, found to buffer effects of stress (Pollock & Duffy, 1990). It has been the first hypothesized global personality concept that was observed to moderate the stress-illness association (Pollock & Duffy, 1990).

According to Maddi (2012), the concept of hardiness can be considered as an array of attitudes and techniques that collectively facilitate turning stressful situations from potential failures to growth opportunities. Hardiness is defined as a synergy of three cognitive elements- control, challenge, and commitment (Kobasa, 1979; Maddi, 2002). *Control* refers to persons' beliefs in their personal ability to control or influence circumstances, *challenge* refers to perception of change as a challenge for further growth and *commitment* refers to one's ability to feel involved and committed to activities of life (Kobasa, Maddi, & Courington, 1981). Individuals with hardiness also perceive stress and change as less threatening, thus lowering their overall reactivity to stressors. The concept of hardiness is similar in many ways to the concept of resilience.

Health hardiness

Health-related hardiness (HRH) is a personality characteristic that enables people to adapt to health issues through three components namely control, commitment and challenge (Pollock, 1989). Kobasa's work was extended by Pollock (1986) to explore hardiness in the context of health and illness. People with health-related hardiness (HRH) when faced with health stressors are shown to demonstrate confidence to appraise and alter responses suitable (control), tend to cognitively re-assess the health stressor to regard it as beneficial, and an opportunity for the growth (challenge). Further, this results in motivation and competence to promote a person's health and coping in dealing with health stressors (commitment) (Pollock & Duffy, 1990). Pollock (1986) has shown that control and commitment aspects of HRH are significantly associated with higher psychosocial adaptation in patients with diabetes and commitment was significantly associated with psychosocial adaptation in those with rheumatoid arthritis and hypertension. Patients with diabetes were found to believe that they had some sort of control over their condition, whereas those with rheumatoid arthritis reported feeling helpless in controlling their condition even if their treatment was effective (Pollock, 1986).

Various scales have been developed to measure the concept of hardiness over the years. Pollock and Duffy (1990) constructed health-related hardiness scale. One of the most recent measures for assessing health hardiness (Abraham, 1993) was 'Health Hardiness Inventory' (HHI). Gebhardt and colleagues in their Dutch validation study of Health Hardiness Inventory, identified four scales (Gebhardt, van Der Doef, & Paul, 2001). These scales are (1) health value, (2) perceived health competence, (3) internal

health locus of control, and (4) external health locus of control. Each of these components is described below.

Health value is the degree to which people value their health. The value attributed to health might depend on socio-cultural factors: it is possible that, in certain cultures, health management might not be perceived as a priority, compared with other concurrent demands (Carlson & Chamberlain, 2003). In health psychology, health value can be considered as an attitude (Eagly & Chaiken, 1993). '*Health value*' is defined as individuals' attitude toward a specific state of health state in terms of— satisfaction, distress, or desirability (Eagly & Chaiken, 1993; Glaz, Rimer, & Lewis, 2002).

Perceived health competence has been conceptualized by Smith, Wallston, and Smith, (1995) to be a domain-specific (health) efficacy construct. It assesses the extent to which individuals perceive themselves to be capable of effectively influencing their health outcomes (or ability to generally manage one's health). It is the confidence in their capability to successfully carry out the necessary health-related behaviour. In other words, perceived health competence is known as a person's generalized expectancy regarding his/her ability to interact efficiently with the environment/situation to achieve a specific goal or desired outcome that is a state of health (Wallston, 1992; Smith, Wallston, & Smith, 1995). It is a combination of behavioural expectancy and outcome expectancy. Behavioural expectancy is the belief on one's capability to carry out a particular behaviour and outcome expectancy refers to the belief that the behaviour will result in good health. According to Wallston's theory (1992), the performance of health behaviours is the function of the interaction between value placed on health (i.e. health value) and perception of competence specific to health (perceived health competence).

Locus of control can be defined as an expectancy belief regarding the source of control over an outcome. There are two distinct sources— internal and external where internal relates to one’s own actions and external relates to chance or powerful others (Smith, Wallston, & Smith, 1995). Wallston and colleagues extended the notion of locus of control to include the multidimensional aspect of health behaviour (Wallston, Wallston & DeVellis, 1978). Locus of control in relation to health refers to the extent of persons’ belief that their health is the consequence of their actions or surrounding circumstances and powerful external agents. Internal locus of control demonstrates that positive health is an outcome of one’s own doing, sustained efforts or willpower whereas external locus of control demonstrates a belief that powerful others or fate has an influence upon health (Wallston et al., 1978). People depicting internal locus of control tend to be more likely to utilize coping strategies concentrated on solving problems in comparison to those showing external locus of control (Kretchy, Owusu-Daaku, & Danquah, 2014).

Health locus of control was shown to play a significant role in health behaviours. It is very significant when individuals highly value their health. Individuals may not engage in health-protective behaviours if they don’t value or place relatively lower value on their health. According to Wallston and Smith (1994), a strong association could be observed between health locus of control and individual’s behaviour only in those with higher health value. Value for health was shown to be moderating the relationship between health behaviour and health locus of control (Lau & Ware, 1981). Interestingly researchers have suggested that chronically ill patients with internal orientation might experience helplessness and frustration as a consequence of their inability to control their health status (Wortman & Dunkel-Schetter, 1979). On the other hand, externally oriented

individuals might not experience higher levels of frustration as they don't try to control their environment hence sustaining a more positive psychological state. In this context patients with external orientation may be more receptive to the recommendations of the healthcare professionals and as a consequence may be more likely to contribute to promoting their health than patients with internal orientation. Nagy and Wolfe (1983) have given evidence indicating that in order to adjust to an environment where personal control is difficult or not possible to achieve, chronically ill patients may modify their orientation (health locus of control) over time towards increased externality. According to some studies, the importance given to health (health value) was found to be a significant aspect in predicting health behaviour than the control beliefs (Wallston, 1992), and were beliefs regarding perceived competence or self-efficacy (Gebhardt et al., 2001).

Rationale and Purpose Statement

Diabetes is a major non-communicable disease both in developed and developing countries. Uncontrolled diabetes has long-term complications which include dysfunction and failure of various organs in the body. And it is also associated with psychological issues such as cognitive disorders and mental health issues. With the increasing number of cases annually, diabetes mellitus and other NCD's have become a major focus of healthcare worldwide. The global burden of diabetes mellitus is enormous in terms of annual expenditure. This rapid growth in prevalence highlights the need to manage the condition in an effective way in order to prevent high morbidity and mortality rate. Diabetes self-management activities include taking medication/insulin injections, regular blood glucose monitoring, adherence to dietary and exercise guidelines, and visiting doctors. Better self-management of diabetes has shown to lead to positive health

outcomes— both physiological and psychological in the long run. On the contrary poor self-management was found to result in poor physical and psychological health.

A range of psychosocial, physiological and economic factors were observed to facilitate or impede diabetes self-management process. Previous research studies have demonstrated that the major psychological factors that influence diabetes self-management and its components include the perception of illness, control beliefs, perceived competence and so on. Various investigators have widely used common sense model for understanding and predicting individuals' adherence towards treatment and illness management (Horne, 2003). However, it was found that there is a dearth of research considering the role of illness perceptions, health hardiness, and demographic variables in predicting overall diabetes self-management and its components among patients of Type 2 diabetes in the Indian context. It was also seen that limited studies have been carried out to explore the facilitating factors and barriers to diabetes self-management. Identifying barriers that lead to poor diabetes self-management would help in developing psychosocial interventions. Physicians, psychologists and policymakers are recognizing the importance of effective diabetes self-management in improving quality of life of the patients and reducing the cost of complications due to diabetes. Therefore the objectives of the present study were to examine diabetes self-management of patients with Type 2 diabetes and to find out whether illness perceptions and health hardiness can predict diabetes self-management. The study has also been carried out to understand various factors determining diabetes self-management of Type 2 diabetes patients.

CHAPTER II

REVIEW OF LITERATURE

A rigorous and step-by-step comprehensive review was done to identify research work examining concepts and theories related to diabetes self-management, illness perceptions, and health hardiness. First, the research articles were systematically located in several databases. Then the relevant articles were selected, summarized and presented in this section to address the key points pertinent to the areas of inquiry. Following keywords were included while searching various databases—diabetes self-management, diabetes self-care, adherence, illness perceptions, illness representations, common sense model, illness cognitions, health hardiness, health-related hardiness, sociodemographic factors, and the combination of all words.

Diabetes Self-Management

Diabetes self-management is critical for positive health outcomes in patients suffering from any type of diabetes. Diabetes self-management includes lifestyle modifications, oral hypoglycemic medications/insulin injections and blood glucose monitoring. Maintaining blood sugar levels under the normal range might require glucose monitoring several times in a day. Research related to various aspects that hinder and facilitate diabetes self-management are discussed. In this chapter the terms self-care, adherence and compliance are used along with diabetes self-management.

Barriers to diabetes self-management

In spite of significant advances in treatment modalities, poor diabetes control is observed among patients. Research has identified various barriers to diabetes self-management. By identifying, understanding and lessening the potential and actual

barriers to adherence health professionals can enhance patients' adherence to prescribed recommendations by using psychological interventions. Some of the barriers include patient factors (beliefs, attitudes, knowledge about the illness, culture/ethnicity/language, co-morbidities, financial resources, and social support) and factors relating to health provider (patient-provider communication, health care system, and beliefs and attitudes of physicians). Some of these factors are described below with empirical evidence.

Physician-related factors

The results of a study indicate that health professionals must employ tailor-made self-care support, for patients basing upon the extent of personal responsibility the patients are willing to take, concerning their diabetes self-management (Ockleford, Shaw, Willars, & Dixon-Woods, 2008). Affordability by the patient, lack of confidence in self to alter patient behaviour, and belief on provider's part that medication cannot cure patient are some of the barriers from provider's perspective identified in a study with respect to diabetes care (Chin et al., 2001). A survey conducted on clinical diabetologists in India reported some of the barriers which include poor awareness among physicians and non-relevance of western guidelines in case of Indian patients (Hasan, Zodpey, & Saraf, 2012).

Blood glucose monitoring

Some of the barriers to blood glucose monitoring have been reported by previous studies. Physical discomfort such as pain caused by pinprick to the finger is one of the major reason for avoiding self-monitoring of blood glucose (SMBG) levels (Chlebowy, Hood, & LaJoie, 2010). Research studies have indicated certain barriers arising from

physician's end. Physicians disinterest or insufficient acknowledgement of efforts put by patients towards SMBG or medical readings have been negatively associated with adherence to blood glucose monitoring (Gallant, 2003). Further lack of communication from the physician, such as not discussing the medical readings have been found to be associated with lowered motivation level towards self-monitoring among patients (Matthews, Peden & Rowles, 2009). Findings of qualitative studies also report similar findings. A study done by Tewahido and Berhane (2017) revealed irregular blood glucose monitoring among the majority of the individuals with Type 2 diabetes.

Adherence to medication

Some of the factors that have been linked with adherence to medication reported in the literature include the cost of medication, regimen complexity and emotional well-being of the patient. Perceptions that patients hold regarding the side effects of the medication and intrusions due to medication on activities of daily living also influence the adherence to medication (Rubin, 2005). In terms of adherence to insulin, both patients and physicians were found to report following reasons for non-adherence or insulin omission: being too busy, skipped meals, travelling, public embarrassment, and stress/emotional problems (Peyrot, Barnett, Meneghini, & Schumm-Draeger, 2012).

Studies indicate that insulin initiation is necessary for tight glycaemic control and delayed onset of diabetes-associated complications (Greaves et al., 2003). Previous research has suggested that in India more number of diabetics fail to attain glycaemic targets (Venkataraman, Kannan, & Mohan, 2009). "Diabetes Attitudes, Wishes and Needs" (DAWN) survey revealed that physicians in India tend to delay insulin initiation as compared to physicians from other countries (Peyrot et al., 2005). An association was

observed between physician's view regarding insulin efficacy and delay in insulin initiation (Peyrot et al., 2005) and this was in turn observed to be related to patient's acceptance of insulin. It was found from the study that female participants (with Type 2 diabetes mellitus) reported greater adherence to medication than their counterparts (Albargawi, Snethen, Gannass, & Kelber, 2016).

Diet management

There are certain factors that hinder adherence to dietary recommendations among diabetes patients. Prohibitive costs of changed diet or low income (Fisher et al., 2005; Tewahido & Berhane, 2017) and prescription of a diet that is not sensitive to the socioeconomic and cultural background of the patient (Brown, Kouzekanani & Hanis, 2002) are two significant factors leading to poor adherence to dietary recommendations among patients. One of the major modifications recommended by physicians is to change from a simple carbohydrate diet to a complex carbohydrate diet (Fukagawa, Anderson, Hageman, Young & Minaker, 1990). However, this is not possible on part of certain patients as they will have to replace easily available cheap sources of simple carbohydrates (for example polished white rice) with more expensive and difficult to obtain complex carbohydrates (Sudha et al., 2013).

Findings of a qualitative study revealed that lack of awareness or information is the most common reason for not complying with a diabetes-friendly diet. Other prominent reasons included personal food preference, inconveniences at the workplace, family meal preparation habits, temptations and negligence. Some of the respondents had also reported that complying strictly with the dietary regimen was boring and practically impossible and restrictions over food would intensify their cravings and make life more

stressful (Tewahido & Berhane's, 2017). Some foods are linked with risk of complications. In a cohort study involving women with diabetes, higher cardiovascular disease risk was found to be associated with greater consumption of saturated fats and cholesterol (Tanasescu, Cho, Manson, & Hu, 2004).

Physical activity or exercise

In recent years, evidence supporting the crucial part played by physical activity towards prevention and management of diabetes has been rising. Physical activity is shown to produce numerous general and diabetes-specific health benefits. Yet despite a large number of benefits, many individuals chose to be physically inactive due to various reasons.

Barriers to compliance with exercise include logistic aspects such as time constraints (Chlebowy et al., 2010), weather, and access to exercise (Thomas, Alder & Leese, 2004). Having comorbid conditions was observed to hinder compliance to exercise (Balhara & Sagar, 2011). Negative attitudes towards exercise or social stigma have been reported as some of the factors for poor adherence to exercise (Greaves et al., 2011). Research has also shown a negative association between external locus of control and exercise. Perceptions of lack of control over illness have been linked to failure in planning and executing exercise routine among patients (Greenhalgh, Helman, & Chowdhury, 1998). Other prominent barriers to exercise management include lack of interest/motivation, unaffordability of gym fees, busy work schedule and viewing exercise as not important.

Numerous barriers to exercise among patients with diabetes from various socioeconomic and ethnic backgrounds have been reported in literature such as physical pain, being overweight, lack of time and unsafe neighbourhoods (Dutton, Johnson, Whitehead, Bodenlos, & Brantley, 2005; Mier, Medina, & Ory, 2007; Brazeau, Rabasa-Lhoret, Strychar, & Mircescu, 2008; Bowman, 2008). A study conducted on obese patients suffering from Type 2 diabetes reported a range of barriers to exercise. Some of them are physical discomfort, lack of interest and time, feeling tired, weather, dislike toward gym, negative past experiences of exercise, transport problems, the dearth of support from family and friends, and high exercise cost (Egan et al., 2013).

Self-care burden and diabetes self-management

Changes in a prescribed regimen can pose a burden to the patient. In a study, the patients revealed a higher self-care burden upon addition of insulin to their regime (Bradley & Speight, 2002). The self-care burden is to a greater extent, the responsibility of the diabetes patient as he/she must decide upon the self-care strategies that need to be exercised and as a result, they experience the consequences of those actions (Glasgow et al., 2001). This could therefore contribute to the self-care burden of diabetes self-management.

Other factors in developing countries

Numerous barriers to self-management towards diabetes have been reported in the psychological literature. Some of the socio-demographic and cultural barriers were found to restrict self-care activities in developing countries. Some of these are the degree of symptoms, poor access to drugs and higher cost. In addition to these factors, patient-

provider relationship, patient satisfaction with medical care, and the unequal distribution of health professionals between urban and rural areas were observed to restrict self-care activities in developing countries (Ciechanowski, Katon, Russo, & Walker, 2001; Norris, Lau, Smith, Schmid, & Engelgau, 2002; Grant, Devita, Singer, & Meigs, 2003; Ramachandran et al., 2007; Debussche, Balcou-Debussche, Besançon, & Traore, 2009).

Studies have revealed that persons with diabetes who tend to follow recommended diet, medication, exercise and regular monitoring of blood glucose report better glycaemic control (Brewer-Lowry, Arcury, Bell, & Quandt, 2010). Effective self-management has shown to improve some of the physiological parameters like body weight, lipid profile and blood pressure (Colberg et al., 2010). It was found to have a positive influence on patient's psychosocial aspects such as lessened distress levels, depression and anxiety (Skinner et al., 2006), optimal utilization of health care services (Panagioti et al., 2014), and reduced diabetes-related costs (Lorig et al., 2001; Buszewicz et al., 2006; Moattari, Ghobadi, Beigi, & Pishdad, 2012). However, diabetes-specific health behaviours that constitute up to ninety-nine per cent of disease treatment (Rubin, 1998) are difficult to maintain over time (Hiss, Anderson, Hess, Stepien & Davis, 1994; Ruggiero et al., 1997). This could be because individuals tend to make health care decisions based on regimen difficulty and existing symptoms and not considering the long-term benefits of health behaviour (Jacobson, de Groot, & Samson, 1995).

Misconceptions regarding diabetes

Misconceptions prevailing among diabetic population act as a major hurdle in achieving optimal blood glucose levels. Some of the myths and misconceptions reported in the literature are summarized and described. A study revealed the following

misconceptions among diabetes patients: prohibition of rice, consumption of specific diet for controlling blood sugar levels, excessive sugar intake causes diabetes and that sugar cannot be used in case of diabetes (Akbar, Aqeel, Noman-Ul-Haq, & Dhingra, 2016). The study by Rai and Kishore (2009) revealed that 18.5 % of diabetics were not aware of the role of diet and lifestyle strategies to control diabetes.

Facilitating Factors to Diabetes Self-Management

Continuous self and medical care and health education are required concerning diabetes self-management to avoid acute complications and minimise the possibility of complications in long run. Though health care providers play a crucial role, a major responsibility of managing diabetes rests on the individual. It has been observed that 95 % of the decisions concerning health on a day-to-day basis are taken by patients without consulting health professionals (Hampson, 1997; Anderson, 1995). These decisions are related to adherence to daily glucose monitoring, diet, exercise, foot care, regulation of drugs, and tobacco smoking and these need to be integrated in work, domestic and leisure routines. Studies have demonstrated that improved active participation and self-care are two key factors responsible for the better outcomes in diabetes patients (Funnell & Anderson, 2000).

Social support

Social support is a crucial component in various theories of health behaviour outlining diabetes self-care performance, (Ruggiero & Prochaska, 1993; Tillotson & Smith, 1996; Osborn & Egede, 2010). Family members were perceived as a significant source of social support among adult diabetics. Family members could influence the

health of the individuals with diabetes in both positive and negative ways (Tang, Brown, Funnell, & Anderson, 2008). Fisher et al (2000) demonstrated that family members were able to facilitate self-care activities such as refilling a prescription and act as agents buffering the harmful impact of stress. Instrumental support was observed to be the most strongly related factor to self-care for various chronic illnesses (DiMatteo, 2004).

Social support plays a major role in patient's compliance to prescribed diet (Gerstle, Varenne, & Contento, 2001; Gallant, 2003; Brewer-Lowry et al., 2010; Greaves et al., 2011). Research has indicated that in maintaining adherence to diet patients preferred to receive emotional and logistic support from their family whereas informational support from the physician (Vijan, Hayward, Ronis & Hofer, 2005). Social support is vital in adherence behaviour, especially in association with engaging in exercise (de Alba Garcia et al., 2007). Individuals with diabetes were found to get the benefit when their family members and friends actively engaged in physical activity along with them (Brewer-Lowry et al., 2010). Studies have revealed that patients receiving support from their significant others were able to overcome challenges posed by self-monitoring of blood glucose (SMBG) (i.e. interpretation of medical readings etc.) (Bergental & Gavin 3rd, 2005; Costa, Pereira & Pedras, 2012).

Physician-related factors

Physicians or doctors play a major role in educating the patients regarding the diabetes self-management. Research studies have demonstrated that those patients (with diabetes) who discuss their treatment-related goals and management plans with their physicians tend to report improved clinical outcomes in comparison to those who do not (Berger & Mühlhauser, 1999; Olivarius, Beck-Nielsen, & Andreasen, 2001). A study

shows that patients who felt that their health care providers understood and supported them displayed high self-confidence leading to successful behaviour change (Williams, Freedman, & Deci, 1998).

Importance assigned to medication adherence

Compliance with medication is a fundamental and vital aspect of diabetes self-management. Two facilitating factors namely patients relationship with their physician and self-discipline influence patients' compliance to medication adherence (Matthews, Peden, & Rowles, 2009). Studies have shown that adherence to medication among Type 2 diabetes individuals is highest as compared to adherence to exercise (Albargawi et al., 2016). In a qualitative study done by Tewahido and Berhane (2017) on Type 2 diabetic patients revealed that most of the patients considered their anti-diabetes medication as most crucial element of diabetes management and the majority of them complied with instructions regarding the medicines more than any other elements of self-care practices.

Dietary knowledge

Several factors like dietary knowledge (Siddiqui, Gul, Ahmedani, Masood, & Miyan, 2010) have been proved to play a crucial role in nutritional self-care. Receiving information about various types of diets is beneficial to the patients as it leads to increased awareness (de Alba Garcia et al., 2007; Brewer-Lowry et al., 2010). A certain type of food is shown to be beneficial to diabetes patients whereas others detrimental. A meta-analysis of research studies with interventions less than four weeks among individuals with diabetes found that the participants who were on low glycaemic index diet were found to show a significant reduction in glycated haemoglobin (HbA1c) in

comparison to those on high glycaemic index diet (Thomas & Elliott, 2010). Similarly, lower incidence of coronary heart disease (CHD) was found to be associated with greater intake of fish (Hu, Cho, Rexrode, Albert, & Manson, 2003).

Knowledge and benefits of exercise

Exercise (amount, type and frequency of exercise) is one of the major predictors of optimal glycaemic control (de Alba Garcia et al., 2007; Brewer-Lowry et al., 2010; Greenhalgh et al., 2011). Various factors help in improving exercise behaviour in patients and some of them are described below. Awareness about various types of exercise and having a chance to select a particular exercise promotes adherence (Skinner et al., 2006). Studies have shown that exercise routine involving elements of fun and aiming to accomplish short-term goals encourages patients, in turn promoting self-management (Johnson, 2000). However, unfortunately, exercise or physical activity remains one of the neglected components of Type 2 diabetes management (Pham, Fortin, & Thibaudeau, 1996). Various types of physical activities were observed to be beneficial to the patients in different ways. In Type 2 diabetes patients, body insulin sensitivity was observed to improve as a result of 1-week aerobic training (Winnick et al., 2008). Similarly, resistance training was found to improve HbA1c or glycated haemoglobin levels (Cauza et al., 2005). Physical activity has also shown to influence the psychological aspects of individuals with Type 2 diabetes. Physical activity was found to reduce stress and feelings of anxiety, increase sense of wellbeing, (Albright et al., 2000; Waxman & Nesto, 2002), lower the risk of other chronic diseases (Waxman & Nesto, 2002; Devlin & Ruderman, 2002) and delay and reduce the functional declines that happens with ageing (Nelson et al., 2007).

Self-control and self-discipline

Patients exhibiting higher self-discipline and self-control tend to make changes in their diet and maintain a healthy diet unlike their counterparts (Brewer-Lowry et al., 2010; Chlebowy, Hood & LaJoie, 2010; Emmanuel & Otovwe, 2015). Patients self-discipline was linked to SMBG i.e. patients who monitor their blood glucose levels regularly have shown better self-management (Brewer-Lowry et al., 2010).

Illness Perceptions and Diabetes Self-Management

The common sense model (CSM) offers a framework elucidating the processes that are involved in initiating and maintaining health behaviours for effective management of illnesses. The model describes dynamic interactions among variables regulating health behaviours adopted in response to current or future health threats. As the model addresses various aspects underlying behaviour, it offers a framework to predict adherence to treatment regime and lifestyle changes adopted for the management of health threats. The model also describes the transition in behaviour i.e. non-adherence to adherence and vice versa (Leventhal, Phillips, & Burns, 2016). This model identifies (1) different factors involved in information processing regarding illness (2) how the information is assimilated to get a lay view of the illness and (3) how this lay view determines behaviour towards coping with illness (Hagger, & Orbell, 2003).

CSM offers a framework for examining the different processes (perceptual, cognitive and behavioural) involved in persons' self-management of health conditions and future health threats (Leventhal, Phillips & Burns, 2016). Various investigators have given evidence to show that perceptions regarding illness are crucial in compliance

(Wolpert & Anderson, 2001; Ford, Havstad, Brooks, & Tilley, 2002; Broadbent, Petrie, Main, & Weinman, 2006). For instance, perceptions of personal control had significant relationship with better self-management in individuals having Type 2 diabetes and perceiving diabetes as having severe consequences was related to less overall self-management (Abubakari et al., 2011). Similarly, in a study of interrelations between beliefs, personality characteristics and self-care among Type 1 diabetics, beliefs emerged as the most important component (Skinner, Hampson, & Fife-Schaw, 2002). Also, perceived effectiveness of treatment predicted all aspects of diabetes self-care. Another study reported that illness perceptions explained 22% of variation in self-management in diabetes patients. In addition higher perceptions of illness coherence was related to increased adherence to overall self-management (Abubakari, Cousins, Thomas, Sharma, & Naderali, 2016).

However, research also has shown that having negative illness perceptions can hinder diabetes self-management. A study by Abubakari and colleagues (2011) showed that perception of diabetes as having severe consequences was related to poor self-management in patients with Type 2 diabetes. Goh et al., (2016), in their study on Type 1 diabetes adolescents showed an association between poor metabolic control and lower beliefs in treatment control. An association between greater emotional representations due to diabetes and poor self-care was also reported (Barnes, 2000).

Illness perceptions, glucose management, and diabetes control

Illness representations explained significant variance (14%) in SMBG among individuals with poorly controlled diabetes. Particularly longer timeline beliefs regarding diabetes were related to greater frequency of SMBG. (Abubakari et al., 2016). In another

study by Abubakari and colleagues (2011) on Type 2 diabetes patients, it was seen that the perception of diabetes with severe consequences was related to higher frequency of SMBG. Findings of Kara et al., (2017) found that fewer beliefs regarding the chronicity of Type 2 diabetes was associated with poor glycated haemoglobin levels (HbA1c).

Attaining diabetic control is an important and ultimate goal of diabetes self-management. Various medical tests show the level of diabetic control in patients, one such test is the HbA1c test. Studies have indicated links between illness specific perceptions and HbA1c levels. Perceptions of personal control were found to predict HbA1c among adults with Type 2 diabetes and it also mediated the association between regimen-related distress and HbA1c (Martinez, Lockhart, Davies, Lindsay, & Dempster, 2018). Similar findings are also observed in Type 1 diabetes individuals where perceptions of personal control significantly predicted HbA1c (Wisting et al., 2016). Findings of meta-analysis revealed that perceptions of stronger identity, timeline cyclical, consequences, and emotional representations were found to have a positive association with HbA1c in diabetes patients (Mc Sharry, Moss-Morris, & Kendrick, 2011).

Illness perceptions and medication adherence

Patients' perceptions regarding diabetes were found to impact their adherence to medication. Perceptions regarding consequences of diabetes and personal control were related to medication adherence in diabetes patients (Broadbent et al., 2011). Perception of the timeline (chronic) was found to predict higher medication adherence in Type2 diabetes patients (Aflakseir, 2012). A study on Type 2 diabetes patients identified perceptions of lower treatment control, higher identity, gender (male) and employed as

the significant predictors of lower medication adherence (Ashur, Shah, Bosseri, Morisky, & Shamsuddin, 2015).

Illness perceptions and dietary management

Self-regulation was found to positively influence adherence to the diet. The reason behind this could be that the patients exhibiting higher levels of self-regulation tend to plan ahead and implement specific behaviours (Fisher et al., 2005). Similarly, dietary adherence was found to be related to perceptions of fewer consequences, higher personal control, higher treatment control, fewer symptoms, lower emotional representations and the belief that management of diet could help diabetes (Broadbent et al., 2011; Washington & Wang-Letzkus, 2009). Similar findings are reported in two different studies where perceptions of diabetes as having a severe impact was related to less dietary self-management (Abubakari et al., 2011) and perception of illness predicted the dietary pattern of the patients with Type 2 diabetes (Kugbey, Asante, & Adulai, 2017). Similarly, another study demonstrated that patients' perceptions regarding diabetes were found to impact their adherence to diet (Broadbent et al., 2011).

Illness perceptions and exercise or physical activity

The result of a study on patients suffering from Type 2 diabetes showed that perception of diabetes with severe consequences and emotional worries about the condition was related to poor exercise self-management (Abubakari et al., 2011). Adherence to exercise was related to higher personal control, illness coherence, perceptions that exercise can help diabetes and can prevent heart problems (Broadbent et al., 2011).

Illness perceptions and health-care use

Symptom perception and perceptions regarding ongoing chronic illness influence the health-care use. A study by Albargawi and colleagues (2016) revealed that the majority of participants (93%) felt the need to visit their doctor regularly. And 90% reported that they need to seek help from their doctor in case their diabetes worsens and 87% believed that seeking help would play a role in preventing the development of diabetes-related complications. In another study stronger illness identity, worry, and longer timeline perceptions were related to higher primary health care use (Frostholm et al., 2005).

Health Hardiness and Diabetes Self-Management

Health-related hardiness is one among the psychological determinants of health behaviours. The following research studies highlight the association between diabetes self-management and health hardiness components i.e. (1) health value, (2) perceived health competence, (3) internal health locus of control and (4) external health locus of control.

Health value and diabetes self-management

Health value operates as a set of central beliefs that shapes behavioural choices, has been positively associated with preventive health behaviour (Fishbein, 1967; Gebhardt, van Der Doef & Paul, 2001; Byrne, 2008). Studies have shown that men score lower on measures examining health value (Gebhardt et al., 2001), which might partly explain their propensity to miss routine health examinations. A study by Albargawi and colleagues (2016) revealed that 87% of patients valued their health highly, to avoid

secondary complications associated with Type 2 diabetes. Findings of a study on Type 2 diabetic individuals being treated with insulin showed that health value was influenced by complications related to Type 2 diabetes (Nugent, Carson, Zammitt, Smith, & Wallston, 2015).

Internal health locus of control (IHLOC) and diabetes self-management

Numerous studies have revealed the association among health locus of control and health care behaviours (Hassanzadeh, Toliati, Hosseini, & Davari, 2006; Moshki, Tavakolizadeh, & Bahri, 2010; Poursharifi & Babapour, 2011). A higher internal orientation is predictive of behaviours undertaken to improve one's health. Feelings of control were observed to be associated with improved physical well-being. This association was found to be strong among individuals with lower risk of cardiovascular disease (Surtees et al., 2010). Findings of a study also show a positive relationship between compliance to the diabetes regimen internal locus of control (Morowatisharifabad et al., 2010).

In a study conducted on Type 2 diabetes patients it was observed that 90 per cent of patients reported IHLOC indicating that they considered themselves responsible for complying with diabetes self-care activities. Furthermore, 80 per cent of the patients believed that it was their fault if their condition worsened, particularly if they were not adhering to their self-management (Albargawi et al., 2016). The results of another study conducted on diabetic patients with foot ulcers found a direct and significant association between IHLOC and self-care behaviours (Abredari et al., 2015). In this study, 20 per cent of individuals reported IHLOC among whom the majority were male participants

and another study involving diabetes patients also reported similar findings (Morowatisharifabad et al., 2010).

External health locus of control (EHLOC) and diabetes self-management

The study on diabetic patients with foot ulcers found that 36 percent of participants emphasized on 'powerful others' indicating that they perceive health care providers, physicians or family members responsible for their health whereas 34 per cent of participants reported 'chance locus of control' indicating that health is a consequence of good luck and illness is an outcome of bad luck or fate. A total of 70 per cent of participants were found to believe in EHLOC (powerful others and chance). Most of the female participants were found to believe in powerful others. This study also indicated a negative association between self-care behaviours and chance health locus of control (Abredari et al., 2015). In a similar study, all the participants (100%) reported that complications as a result of diabetes were because of God's will and God could help in case their condition worsens (Albargawi et al., 2016). In addition, more than half of the participants believed fate as a reason for the worsening of their diabetes. Research also found that external locus of control increased with age (Morowatisharifabad et al., 2010).

Perceived health competence and diabetes self-management

Perceived health competence was found to predict a range of health behaviours. For instance perceived health competence was reported to be observed with increase in exercise, improved dietary habits, and improved health information seeking (Marks & Lutgendorf, 1999; Arora et al., 2002; Tromp et al., 2005; Bellizzi et al., 2009). Further higher perceived health competence was linked with increased confidence in health-care

professionals and social support (Christensen, Wiebe, Benotsch & Lawton, 1996; Rueda & Pérez-García, 2006). Similar findings were observed in a study on patients suffering from Type 2 diabetes residing in Mizoram, India (Lalnuntluangi, Chelli, & Padhy, 2017). In the study outcome expectancy which is a component of perceived health competence was observed to explain a significant proportion of variance in diabetes self-management.

Illness Perceptions and Health Hardiness

Research has examined the links between perceptions about illness and health hardiness components. The study conducted by Brooks (2008) on individuals with chronic illness found that those reporting higher health-related hardiness were observed to possess higher self-perception regarding their health status. In another study conducted by Chelli, Lalnuntluangi and Padhy (2017) on individuals with Type 2 diabetes to examine health hardiness and illness perceptions found that EHLOC predicted perceptions of consequences and internal orientation predicted perceptions of personal and treatment control and perceived health competence predicted emotional representations in patients suffering from Type 2 diabetic.

Summary

The primary aim of diabetes self-management is to achieve optimal blood glucose levels, positive health outcomes and overall well-being. It can be derived from the literature review that diabetes self-management is an outcome of various processes and factors. Diabetes self-management can decrease as a result of misconceptions hindering the process and deter due to lack of knowledge, social support, or poor communication from the physicians end and so on. On the contrary, the process can be improved by

strengthening the facilitating factors. Studies have supported the predictive role of various demographic variables such as gender, age, duration of disease, comorbid conditions etc. in illness management. Investigators have provided evidence that the presence of co-morbid conditions can have a detrimental impact on aspects of diabetes self-management. Other than demographic variables literature has also suggested that individual's psychological factors such as beliefs, attitudes and personality also influences diabetes self-management. Two such factors are illness perceptions and health hardiness. Research studies have shown the significant role played by illness perceptions in predicting each element of diabetes self-management ranging from blood glucose monitoring, compliance to diet, exercise regime and consulting the physician. These perceptions were found to help an individual suffering from illness to make sense of illness and guide illness management. The value placed on health and its promotion is an integral part of sustaining with ongoing illness management efforts. Likewise, control is a significant aspect of health hardiness and studies have supported its major predictive role in self-care and adherence to treatment regime. Literature review suggests that an individual's perceived competence towards managing their overall health plays a crucial role. Both positive perceptions and hardiness— are two internal resources available to an individual to improve disease management. A mixed method design involving the role of illness perceptions and health hardiness and exploration of factors contributing to diabetes self-management will be insightful in throwing light on the determinants of effective diabetes self-management and its components. It was intended as an initial step towards the development of an education and self-management program, meant specifically at supporting patients, with Type 2 diabetes, in the Indian context. Depending

on the research findings of studies done on Type 2 diabetes patients on related constructs, the following research questions, objectives, and hypotheses were formulated.

Research Questions

The present study was undertaken to find answers to the below given research questions.

- (1) What is the level of illness perceptions, health hardiness and diabetes self-management among Type 2 diabetes patients?
- (2) Is there any relationship between demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions, health hardiness and diabetes self-management among Type 2 diabetes patients?
- (3) Do demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions, and health hardiness predict diabetes self-management among Type 2 diabetes patients?
- (4) What are the lived experiences of Type 2 diabetes patients for understanding the facilitating factors and barriers to diabetes self-management?

Objectives

The main objectives of the present study were

- (1) To assess the level of illness perceptions, health hardiness and diabetes self-management among Type 2 diabetes patients.
- (2) To examine the relationship between demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions, health hardiness and diabetes self-management among Type 2 diabetes patients.

- (3) To examine whether demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions and health hardiness predict diabetes self-management among Type 2 diabetes patients.
- (4) To explore the lived experiences of Type 2 diabetes patients for understanding the facilitating factors and barriers to diabetes self-management.

Hypotheses

Following hypotheses were formulated to address the objectives. No hypothesis was formulated against the fourth objective as it was addressed using the qualitative approach.

- (1) It was hypothesized that there would be a relationship between demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions, health hardiness, and diabetes self-management among Type 2 diabetes patients.
- (2) It was hypothesized that demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions and health hardiness would predict diabetes self-management among Type 2 diabetes patients.

CHAPTER III

METHOD

This chapter provides the plan, design, and sample of the present study; the research instruments that were used and the procedure that was followed to reach the objectives of the study.

Plan and Design

The study was carried out following a sequential explanatory mixed methods design (Creswell, 2003, p. 211). Hence the study was carried out in two phases. Phase I of the study followed a quantitative research approach and phase II followed a qualitative research approach. In phase I, a cross-sectional survey design was adopted. Figure 1 schematically presents the plan and design of the study.

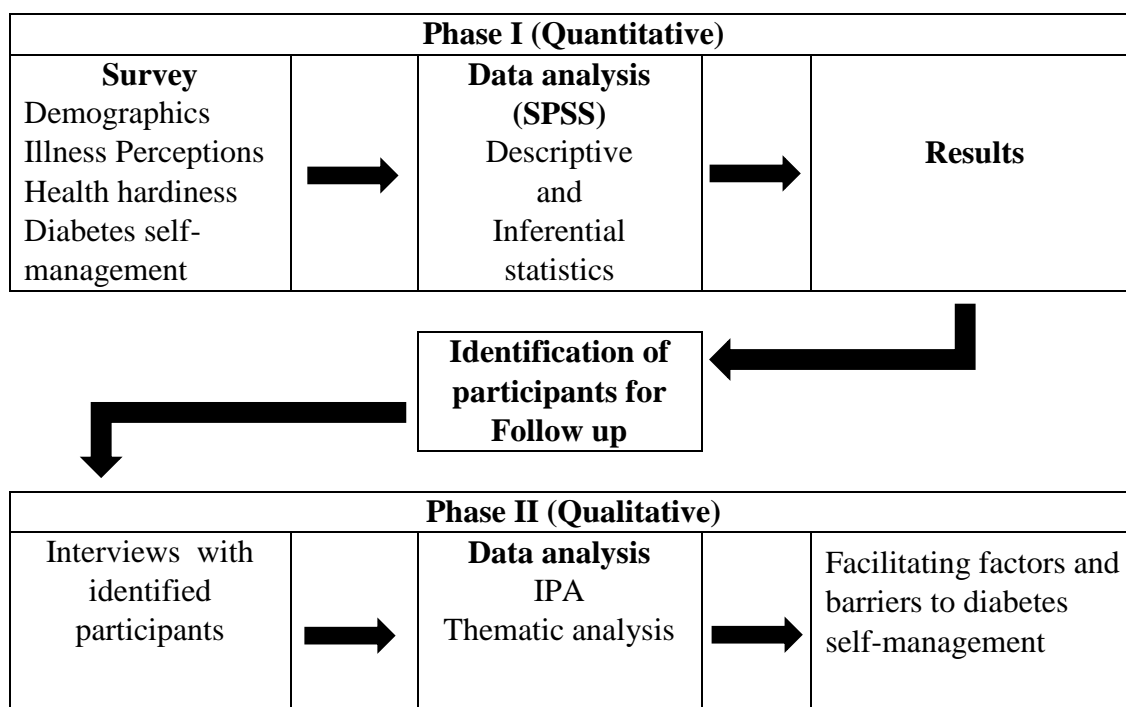


Figure 1. Schematic presentation of plan and design of study

Illness perceptions, health hardiness, and demographic details (gender, age, duration of diabetes, and comorbid conditions) were the predictors and diabetes self-management was the criterion which was measured across four aspects namely (1) glucose management, (2) dietary control, (3) physical activity, (4) health-care use, and overall self-care. In phase II, a qualitative approach was followed to explore various factors involved in diabetes self-management in individuals with Type 2 diabetes. The basic objective was to give detailed examinations of “personal lived experiences” (Smith, Flowers, & Larkin, 2009). Hence interpretative phenomenological analysis (IPA) had been utilized in the study. It has three key theoretical underpinnings— (a) *phenomenology* (b) *hermeneutics* and (c) *idiography*. (Smith et al., 2009)

Phenomenology, a philosophical approach, developed by Husserl (1999) aims to produce an account of individuals lived experience of an event/s (phenomena) in its own terms instead of describing it according to the pre-existing theoretical preconceptions (Smith & Osborn, 2015). The analytical process involved in IPA is described as a double hermeneutic or dual interpretation process (Smith & Osborn, 2008). Firstly, the individuals make sense/meaning of their personal and social world and secondly, the investigator tries to interpret that meaning and make sense of individuals’ meaning-making. The interpretative phenomenological analysis is an approach with idiographic focus involving an in-depth exploration of each case before producing any general statements. In IPA there is an attempt to explore or get closer to ‘insider’s perspective’ (Conrad, 1987).

The primary goal of IPA is to understand individuals’ own experiences and not testing a preconceived hypothesis using larger samples (Smith, 2008). In the present

study, an attempt was made to explore the lived experiences of Type 2 diabetes patients to understand the factors influencing (facilitating factors and barriers) their diabetes self-management.

Pilot Study

A pilot study was carried out to test the feasibility of data collection instruments in the Indian context, design of study, protocol to be followed in the study, and to verify the sample recruitment. After meeting these objectives, the main study was conducted.

Participants

The study included 286 Type 2 diabetes patients (50.7% men and 49.3% women) recruited through purposive sampling method. The inclusion criteria for the selection of the participants was having a diagnosis of Type 2 diabetes and exclusion criteria were (1) presence of any psychological ailments (2) presence of terminal illness and (3) individuals who refuse to provide informed consent. Hyderabad, a capital city in India was selected for data collection as it was convenient for the investigator to conduct the study. Demographic information regarding age, gender, duration of diabetes, presence of comorbid conditions, education, employment, and marital status was obtained in this study. Duration of diabetes was explained in terms of months. Presence of comorbid condition was dichotomized into presence (yes) and absence (no). Education was also dichotomized into educated and no formal education. Employment levels were categorized into employed, unemployed/not reported, housewives, and retired. Marital status was divided into married, unmarried, and widowed. The basic characteristics of the participants are shown in table 1.

Table 1

Summary of Participants' Characteristics (N = 286)

	Men	Women	Total
Gender	145(50.7%)	141(49.3%)	286
Age	27 - 83 years	28 - 83 years	27 - 83 years
<i>M(SD)</i>	57.25(10.53)	54.89(11.54)	56.09(11.09)
Duration of diabetes	1 month - 32	2 month – 30	1 month - 32
<i>M(SD)</i>	years 9.75(7.78)	years 8.71(6.57)	years 9.24(7.21)
Presence of comorbid conditions			
No	97 (33.92%)	86 (30.06%)	183 (63.99%)
Yes	48 (16.78%)	55 (19.23%)	103 (36.01%)
Education			
No formal education	13 (4.54%)	54 (18.88%)	67 (23.43%)
Educated	132 (46.15%)	87 (30.42%)	219 (76.57%)
Employment			
Employed	80 (27.97%)	33 (11.54%)	113 (39.51%)
Unemployed/Not reported	42 (14.68%)	55 (19.23%)	97 (33.92%)
Retired	23 (8.04%)	2 (0.70%)	25 (8.74%)
Housewives		51 (17.83%)	51 (17.83%)
Marital status			
Married	85 (29.72%)	87 (30.41%)	172 (60.14%)
Unmarried/Not reported	59 (20.63%)	45 (15.73%)	104 (36.36%)
Widowed	1 (0.35%)	9 (3.15%)	10 (3.5%)

Note. Frequency (Percentage); *M* = mean; *SD* = standard deviation

The age range of the sample was 27 years to 83 years ($M = 56.09$; $SD = 11.09$). For men the age range was 27 to 83 years ($M = 57.25$; $SD = 10.53$) and for women it was 28 to 83 years ($M = 54.89$; $SD = 11.54$). The duration of diabetes for the sample ranged from above one month to 32 years ($M = 9.24$; $SD = 7.21$). The duration of diabetes for men was one month to 32 years ($M = 9.75$; $SD = 7.78$) and for women it ranged from 2 months to 30 years ($M = 8.71$; $SD = 6.57$).

Comorbid conditions were reported by 103 (36%) participants and rest 183 (64%) participants did not have any comorbid conditions. The comorbid conditions included arthritis, hypertension, cardiovascular diseases, respiratory diseases, thyroid conditions, cancer, and paralysis. Relatively more women 55 (19.23%) reported comorbid conditions as compared to men 48 (16.78%). Regarding education 219 (76.57%) participants were educated whereas 67 (23.43%) participants had no formal education. Compared with female participants (30.42%) more no of male participants (46.15%) had some form of education. The distribution of sample on the basis of employment was— 113 employed (39.51%), 97 unemployed/did not answer (33.92%), 25 (8.74%) retired, and 51 housewives (17.83%). Compared with female participants (11.54%), more number of male participants were employed (27.72%). The distribution of participants on the basis of marital status was— married (60.14%), unmarried/not reported (36.36%), and widowed (3.5%).

Basing on the findings of phase I, ten participants (five with high diabetes self-management scores and five with low diabetes self-management scores) were selected. These participants had given their consent to take part in the interviews in phase II of the study.

Measures

Phase I of the study focused on assessment whereas phase II involved semi-structured interviews. In phase I, three measures (Revised Illness Perception Questionnaire, Revised Health Hardiness Inventory, and Diabetes Self-Management Questionnaire) and demographic form were used. The measures and demographic form are appended (*Appendix B*). The Telugu version (regional language) of the measures was also given to the participants as per their request. A standard procedure was followed in translating the original English scales to the regional language. To avoid the ambiguity, these translated measures were re-translated into the English language by an expert independently and compared with the original versions. The informed consent (*Appendix B*) and demographic forms were also translated into regional language. The measures are described below with their scoring procedures and psychometric properties.

Demographic form

The demographic form was designed for this study which included participants' personal details such as name, gender, age, duration of diabetes, comorbid conditions, use of insulin, place of residence, employment, education, marital status and primary care provider (*Appendix B*).

Revised Illness Perception Questionnaire (IPQ-R)

This questionnaire (Moss-Morris et al., 2002) captures participants' own representations (or perceptions) regarding their diabetes (*Appendix B*). It consists of three distinct sections. The first section measures identity which comprises of fourteen symptoms. The participants are instructed to rate whether they have experienced given

symptoms since their diagnosis of diabetes using a ‘yes/no’ format. And also if they believe that the symptom to be particularly related to their diabetes using the same ‘yes/no’ format. The total of yes rated symptoms on the second column represents identity subscale. Higher scores on this reflect participant’s strong belief that the symptom experienced is associated to their diabetes.

The second section has 38 statements under following subscales (a) timeline (acute/chronic) (example of item- “I expect to have this diabetes for the rest of my life”), (b) consequences (example of item – “my diabetes does not have much effect on my life”) (c) personal control (example of item – “there is a lot which I can do to control my symptoms”) (d) treatment control (example of item – “the negative effects of my diabetes can be prevented (avoided) by my treatment”) (e) illness coherence (example of item – “I have a clear picture or understanding of my condition”) (f) timeline cyclical (example of item – “I go through cycles in which my diabetes gets better and worse”) and (g) emotional representations (example of item – “having this diabetes makes me feel anxious”). Timeline (acute/chronic), personal control, consequences, and emotional representations subscales have six items each. Whereas Treatment control subscale and illness coherence subscale has five items each and timeline cyclical subscale has four items. Each statement is given agreement or disagreement using a 5-point Likert scale and response options range from “*strongly disagree*” (1) to “*strongly agree*” (5). Few items are to be reverse scored.

The third section is related to causes and comprises of 18 causes namely “stress or worry, hereditary-it runs in my family, a germ or virus, diet or eating habits, chance or bad luck, Poor medical care in my past, pollution in the environment, my own behavior,

my mental attitude, family problems or worries, overwork, my emotional state, ageing, alcohol, smoking, accident or injury, my personality and altered immunity”. Each statement is rated on a five-point Likert scale which ranges from “*strongly disagree*” to “*strongly agree*”. At last the participants are requested to name the three most important factors that they believe are the causes of their diabetes in rank order. For the subscales, internal consistency values were found to range from 0.79 to 0.89 in patients with various chronic illnesses (Moss-Morris et al., 2002). Reliability for this study was calculated utilizing Cronbach’s alpha. The Cronbach’s alpha values of the subscales for the present study are- identity (0.87), timeline (acute/chronic) (0.88), consequences (0.77), personal control (0.80), illness coherence (0.88), treatment control (0.75), timeline cyclical (0.82), and emotional representations (0.93).

Revised Health Hardiness Inventory (RHHI-24)

The RHHI-24 (Gebhardt, van der Doef, & Paul, 2001) is based on Health Hardiness Inventory (Abraham, 1993) and comprises of health belief statements (*Appendix B*). It has four scales: (a) health value (includes 6 items; example – “I am determined to be as healthy as I can be”), (b) internal health locus of control (includes 5 items; example – “I am directly responsible for my health”), (c) external health locus of control (includes 7 items; example – “when I stay healthy, I am just plain lucky”) and (d) perceived health competence (includes 6 items; example – “I’m generally able to accomplish my goals with respect to my health”). Few items are to be reverse scored for computation of scale. Items are given a rating using a five-point Likert scale comprising response options “*strongly disagree*” (1) to “*strongly agree*” (5). The scores on each scale are obtained by summing item scores. Then dividing the sum by the total number of items

in that particular scale (Gebhardt et al., 2001). Scores on all four scales range from 1 to 5. In a sample containing general population the reliability coefficient of the scales (Dutch version) was found to be adequate (0.66 to 0.79) (Gebhardt et al., 2001). The Cronbach's alpha values of the scales for the current study are- health value (0.91), internal health locus of control (0.85), external health locus of control (0.68), and perceived health competence (0.63).

Diabetes Self-Management Questionnaire (DSMQ)

This questionnaire (Schmitt et al., 2013) measures self-care activities associated with glycemic control (*Appendix B*). It has 16 items under four subscales namely- 'glucose management' (example of item- "I check my blood sugar levels with care and attention"), 'dietary control' (example of item - "the food I choose to eat makes it easy to achieve optimal blood sugar levels"), 'physical activity' (example of item- "I do regular physical activity to achieve optimal blood sugar levels"), and 'health-care use' (example of item - "I keep all doctors' appointments recommended for my diabetes treatment"). One item (item 16- "my diabetes self-care is poor.") requests a total rating of participant's self-care and it is only to be included in the 'sum scale'.

Participants' rate the applicability of each statement to them on a 4 point Likert scale and response options include- "applies to me very much" (3 points), "applies to me to a considerable degree" (2 points), "applies to me to some degree" (1 point) and "does not apply to me" (0). The participants are requested to rate the degree to which each item is applicable to their self-management in the previous 8 weeks. Negatively worded items are reversed as part of scoring so that higher values are reflective of effective self-care. The scores on each subscale are obtained by summing item scores and

then transforming to a scale which ranges from 0 to 10 “(raw score/theoretical maximum score*10)”. The Cronbach’s alpha coefficients ranged from 0.60 to 0.77 for the subscales and 0.84 for sum scale in a sample of patients with type 1 and 2 diabetes (Schmitt et al., 2013). The Cronbach’s alpha values for each of the subscales for the present study are- glucose management (0.79), dietary control (0.73), physical activity (0.79), health care use (0.45) and sum scale (0.86).

Interviews

In phase II of the study, semi-structured in-depth interview sessions were conducted with each participant to obtain the qualitative data. The major focus was to explore lived experiences of individuals with Type 2 diabetes to understand facilitating factors and barriers to their diabetes self-management. The interviews were guided by two broad questions (1) what are the factors that contributed to or facilitated your diabetes self-management? and (2) what are the factors that inhibited or hindered your diabetes self-management? Various probes and prompting questions were used during the interview process. The procedure followed in conducting interviews is mentioned under procedure.

Procedure

Before conducting the study, the approval from the Institutional Ethics Committee (*Appendix A*) of the University of Hyderabad was obtained. Prior to the data collection, various diabetes clinics from Hyderabad were selected and official permissions were obtained from the authorities of the clinics. The data collection (phase I & II) was completed within six months. The study was carried out in two sequential

phases i.e. phase I (quantitative) was preceded by phase II (qualitative). Hence two separate procedures were followed to generate both quantitative and qualitative data. In phase I, an individual assessment was conducted to obtain quantitative data for the first three objectives. In phase II, there was an in-depth interview to generate qualitative data.

Individual assessment

The sample was recruited from outpatient diabetic clinics in Hyderabad, Telangana. Before enrolling the participants into the study, they were informed about the objectives of the study, the type and nature of the questions, and the duration of the assessment. The participants were informed that their participation would be voluntary and at any given point of time, they would be free to withdraw during the assessment process. The respondents were assured that their identity and responses will be kept confidential and would only be utilized for research purposes. The informed consent was obtained before starting the assessment. Rapport was established with the participants and they were given research measures and demographic form with printed instructions depending on their language of preference. The assessment was done during their visit to the clinic. The participants were able to complete the measures in one to two sessions and the duration of both the sessions varied from 20 to 35 minutes. All the doubts of the participants regarding the statements and instructions in the scales were clarified. At the completion of each assessment, the participants were debriefed. Permissions were obtained from all the participants to contact them for phase II data collection (interviews) if required.

Interviews

Interview sessions were conducted with 10 participants identified as having high (5 participants) and low (5 participants) scores on overall diabetes self-management from phase I data analysis. These participants were informed regarding the purpose of the interview, the type of interaction and the approximate time for each interview session. The interviews were conducted at the participants' residence and clinic based on their preference. The average duration of each face-to-face individual interview session was 25-35 minutes. During the interview sessions, an attempt was made to elicit qualitative data that would help in understanding the facilitating factors and barriers to diabetes self-management. The protocol of standard in-depth interview was followed and demographic details of these 10 identified participants were not collected again as it was already taken in phase I. Participants were debriefed after the completion of the interviews.

CHAPTER IV

RESULTS

This chapter describes the analysis of the data of the study carried out in two phases: phase I (quantitative; survey data) and phase II (qualitative; semi-structured interviews). Phase I presents the results of descriptive and inferential statistics on a sample of 286 whereas phase II presents the findings of analysis of semi-structured interviews of the ten participants regarding their self-management to illness i.e. Type 2 diabetes.

Phase I (Quantitative) Data Analysis

The quantitative data were analyzed in terms of descriptive statistics (frequencies and percentages), Pearson's correlation (Pearson's r), and hierarchical multiple regression analysis using IBM statistical package for social sciences (SPSS) version 20. In the analysis, the predictors were demographic variables (gender, age, duration of diabetes, and comorbid conditions), illness perceptions, and health hardiness. The criterion was diabetes self-management and its subscales—(1) glucose management, (2) dietary control, (3) physical activity and (4) health-care use. Hierarchical multiple regression analysis was computed to find out the predictors of diabetes self-management. Prior to this, the Pearson's r was computed to find out the linear relationship between the predictors and criterion as well as to identify the suitable predictors to be entered into the models of the hierarchical multiple regression. Subsequently, content analysis was employed to analyze the data collected as part of section 3 of revised illness perception

questionnaire (i.e. participants were requested to report three factors responsible for their Type 2 diabetes in rank order).

Descriptive Statistics, Score Range, and Reliability for all Variables

The mean scores (M), standard deviation values (SD), 95% confidence intervals (CI), score range and Cronbach's alpha for illness perceptions, health hardiness, diabetes self-management and its subscales for the study sample ($N = 286$) are presented in Table 2.

Table 2

Summary of the Means (M), Standard Deviation (SD), 95% CI, Score Range and Cronbach's Alpha for Illness Perceptions, Health Hardiness and Diabetes Self-Management and its Subscales

Variables	M (SD)	95% CI		Score Range	Cronbach's Alpha
		LL	UL		
Illness Perceptions (IPQ-R)					
Identity	3.69 (3.65)	3.27	4.12	0-14	0.87
Timeline (acute/chronic)	23.82 (5.23)	23.21	23.43	6-30	0.87
Consequences	19.25 (5.92)	18.56	19.94	6-30	0.77
Personal control	21.40 (5.18)	20.80	22.00	6-30	0.80
Treatment control	18.90 (3.91)	18.44	19.35	5-25	0.74
Illness coherence	16.38 (4.99)	15.80	16.97	5-25	0.88
Timeline cyclical	12.93 (4.21)	12.44	13.42	4-20	0.82
Emotional representations	17.86 (7.49)	16.99	18.73	6-30	0.93
Health Hardiness (RHHI-24)					
Health value	3.79 (0.87)	3.69	3.89	1-5	0.91
Internal health locus of control	3.51 (0.94)	3.40	3.62	1-5	0.84
External health locus of control	2.95 (0.74)	2.86	3.03	1-5	0.67
Perceived health competence	3.34 (0.74)	3.25	3.42	1-5	0.64
Diabetes Self-Management (DSMQ)					
Glucose management	7.66 (2.24)	7.39	7.92	0-10	0.80
Dietary control	6.58 (2.40)	6.30	6.86	0-10	0.72
Physical activity	5.94 (3.17)	5.57	6.31	0-10	0.79
Health-care use	7.09 (2.31)	6.82	7.36	0-10	0.45
Sum scale (overall diabetes self-management)	6.88 (1.87)	6.66	7.10	0-10	0.86

From Table 2 it was found that the M and SD values of illness perceptions were - identity ($M = 3.69$; $SD = 3.65$), timeline (acute/chronic) ($M = 23.82$; $SD = 5.23$), consequences ($M = 19.25$; $SD = 5.92$), personal control ($M = 21.40$; $SD = 5.18$), treatment control ($M = 18.90$; $SD = 3.91$), illness coherence ($M = 16.38$; $SD = 4.99$), timeline cyclical ($M = 12.93$; $SD = 4.21$), and emotional representations ($M = 17.86$; $SD = 7.49$). The Cronbach alpha values for illness perceptions ranged from 0.74 to 0.93 indicating that all the values are in acceptable range.

The M and SD values of health hardiness for the sample were – health value ($M = 3.79$; $SD = 0.87$), internal health locus of control ($M = 3.51$; $SD = 0.94$), external health locus of control ($M = 2.95$; $SD = 0.74$), and perceived health competence ($M = 3.34$; $SD = 0.74$). The Cronbach's alpha values for the health hardiness scales ranged from 0.64 to 0.91 indicating that all the values are in acceptable range. Similarly, the M and SD values of diabetes self-management and its subscales were: glucose management ($M = 7.66$; $SD = 2.24$), dietary control ($M = 6.58$; $SD = 2.40$), physical activity ($M = 5.94$; $SD = 3.17$), health-care use ($M = 7.09$; $SD = 2.31$) and sum scale (overall diabetes self-management) ($M = 6.88$; $SD = 1.87$). The Cronbach's alpha values for the sum scale (overall diabetes self-management) and four subscales ranged from 0.45 to 0.86 indicating that all the values are in acceptable range except for the dimension health care-use. The score range for all the variables and 95% CI are also displayed in Table 2.

Frequency and Percentage of Symptoms associated with Diabetes (identity scale of IPQ-R)

Section one of revised illness perception questionnaire provided fourteen symptoms. Participants were requested to indicate whether they had experienced any of the given symptoms since their diagnosis of diabetes, and whether they believed that the given symptoms were associated with their diabetes on yes/no response format. The symptoms were: (1) pain, (2) sore throat, (3) nausea, (4) breathlessness, (5) weight loss, (6) fatigue, (7) stiff joints, (8) sore eyes, (9) wheeziness, (10) headaches, (11) upset stomach, (12) sleep difficulties, (13) dizziness and (14) loss of strength. The frequencies and percentages of the symptoms endorsed by patients associated to their condition (second rating) are presented in Table 3.

Table 3

Frequency and Percentage of Symptoms related to Diabetes

Symptoms	Response (Yes)	Response (No)
Pain	102 (35.7)	184 (64.3)
Sore throat	28 (9.8)	258 (90.2)
Nausea	36 (12.6)	250 (87.4)
Breathlessness	38 (13.3)	248 (86.7)
Weight loss	92 (32.2)	194 (67.8)
Fatigue	142 (49.7)	144 (50.3)
Stiff joints	76 (26.6)	210 (73.4)
Sore eyes	78 (27.3)	208 (72.7)
Wheeziness	39 (13.6)	247 (86.4)
Headaches	68 (23.8)	218 (76.2)
Upset stomach	57 (19.9)	229 (80.1)
Sleep difficulties	81 (28.3)	205 (71.7)
Dizziness	72 (25.2)	214 (74.8)
Loss of strength	147 (51.4)	139 (48.6)

Note. Frequency (percentage)

From the Table 3 it was found that the loss of strength (147; 51.4%) was the highest reported symptom followed by fatigue (142; 49.7%), and pain (102; 35.7%) whereas sore throat (28; 9.8%), nausea (36; 12.6%), breathlessness (38; 13.3%), and wheeziness (39; 13.6%) were the least reported symptoms by the participants related to their diabetes. The frequency and percentage of other symptoms are— weight loss (92; 32.2%), sleep difficulties (81; 28.3%), sore eyes (78; 27.3%), stiff joints (76; 26.6%), dizziness (72; 25.2%), headaches (68; 23.8%), and upset stomach (57; 19.9%). The ‘yes’ and ‘no’ rated symptoms (with frequencies) are graphically presented in graph 1. It represents the frequency of symptoms as reported by patients’ related to their diabetes.

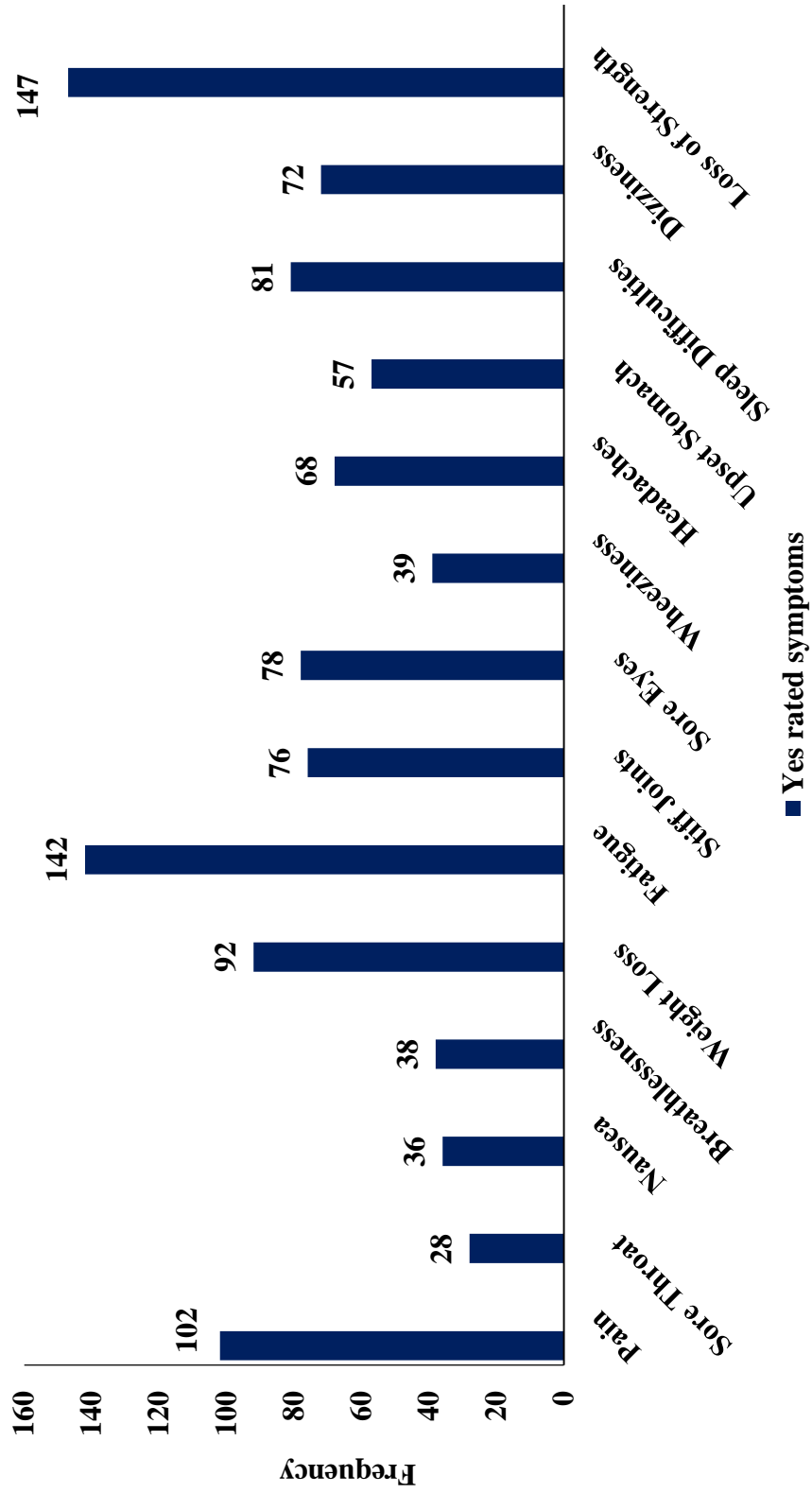


Figure 2. Bar graph presenting frequency distribution of symptoms presented in identity scale

Relationship between the Predictors

Relationship between illness perceptions, health hardiness, and demographic variables (gender, age, duration of diabetes, and comorbid conditions).

Pearson's correlation (r) was carried out to find out the relationship between predictors - demographic variables (gender, age, duration of diabetes and comorbid conditions), illness perceptions (timeline (acute/chronic), consequences, personal control, treatment control, illness coherence, timeline cyclical, and emotional representations), and health hardiness scales (health value, internal health locus of control, external health locus of control, and perceived health competence). The results of correlation are presented in Table 4.

Table 4
Summary of the Correlation of Predictors

	Predictors			
	Gender	Age	Duration of Diabetes	Comorbid Conditions
Illness Perceptions				
Timeline (acute/chronic)	-.04	.24**	.33**	.19**
Consequences	.18**	.06	.13*	.06
Personal control	-.04	-.05	-.04	.09
Treatment control	.02	-.09	-.09	-.01
Illness coherence	-.10	-.04	.07	.04
Timeline cyclical	-.01	.07	.13*	.00
Emotional representations	.15**	-.20**	-.10	-.09
Health Hardiness				
Health value	-.04	.06	.12*	.13*
Internal health locus of control	-.15*	.06	.01	.08
External health locus of control	.12*	-.09	-.05	.10
Perceived health competence	-.05	.03	.11	.19**

Note. Male = '0'; Female = '1'; Absence of comorbid conditions = '0', Presence of comorbid conditions = '1'; * $p < .05$; ** $p < .01$

*(a) Relationship between illness perceptions and demographic variables
(gender, age, duration of diabetes, and comorbid conditions)*

Illness perceptions and gender

A significant positive relationship was observed between consequences and gender ($r = .18, p < .01$) as well as emotional representations and gender ($r = .15, p < .01$) indicating that women perceived diabetes with severe consequences and experienced high emotional worries (upset, anger, anxiety) as a result of their condition. However, no significant relationships were observed between timeline (acute/chronic), personal control, treatment control, illness coherence, and timeline cyclical and gender.

Illness perceptions and age

A significant positive relationship was observed between timeline (acute/chronic) and age ($r = .24, p < .01$). This implies that older age is associated with perceiving diabetes as long term or chronic condition. The results also revealed significant negative relationship between emotional representations and age ($r = -.20, p < .01$). This implies that older age is associated with fewer emotional worries due to diabetes and vice versa. However, no significant relationships were observed between consequences, personal control, treatment control, illness coherence, and timeline cyclical and age.

Illness perceptions and duration of diabetes

The results revealed significant positive relationship between duration of diabetes and timeline (acute/chronic) ($r = .33, p < .01$), consequences ($r = .13, p < .05$), and timeline cyclical, ($r = .13, p < .05$). This implies that longer duration of diabetes is associated with perceiving diabetes as a long term/chronic, and unstable condition with

severe consequences. However, no significant relationships were noticed between following personal control, treatment control, illness coherence, and emotional representations and duration of diabetes.

Illness perceptions and comorbid conditions

The results revealed a significant positive relationship between timeline (acute/chronic) and comorbid conditions ($r = .19, p < .01$), indicating that presence of comorbid conditions is associated with perceiving diabetes as chronic condition. However, no significant correlations were observed between comorbid conditions and rest of the illness perceptions.

(b) Relationship between health hardiness and demographic variables (gender, age, duration of diabetes, and comorbid condition)

Health hardiness (internal health locus of control and external health locus of control) and gender

The results revealed a significant inverse association between internal health locus of control and gender, ($r = -.15, p < .05$). This indicates that men demonstrated a higher score on internal health locus of control. Contrarily a significant positive relationship was observed between gender and external health locus of control ($r = .12, p < .05$). This indicates that women demonstrated a higher score on external health locus of control or women were more externally oriented. Results revealed no significant relationship between health value, perceived health competence and gender.

Health hardiness and age

Age did not show any significant correlation with any one of the scales of health hardiness.

Health hardiness (health value) and duration of diabetes

The results revealed a positive relationship between health value and duration of diabetes, ($r = .12, p < .05$). This implies that longer duration of diabetes is associated with higher health value. Results revealed that internal and external health locus of control, and perceived health competence did not show significant relationship with duration of diabetes.

Health hardiness (health value and perceived health competence) and comorbid conditions

The results revealed a positive relationship between health value and comorbid conditions, ($r = .13, p < .05$) and perceived health competence and comorbid conditions, ($r = .19, p < .01$). This implies that presence of comorbid conditions is associated with higher value for health and higher perceived health competence. However no significant correlation was observed between internal and external health locus of control and comorbid conditions. From Table 4, it was found that the correlation coefficients varied between $-.15$ to $.33$.

Relationship between Predictors and Criterion

Pearson's correlation (r) was carried out to find out the relationship between the predictors and criterion. The predictors were—demographic variables (gender, age, duration of diabetes, and comorbid conditions), illness perceptions (timeline (acute/chronic), consequences, personal control, treatment control, illness coherence, timeline cyclical, and emotional representations), health hardiness (health value, internal health locus of control, external health locus of control, and perceived health competence). The criterion was— diabetes self-management and its subscales (glucose management, dietary control, physical activity, and health-care use). The results of correlation are presented in Table 5.

Table 5

Summary of the Correlation between Predictors and Criterion

Predictors	Criterion				
	Glucose Management	Dietary Control	Physical Activity	Health-Care Use	Sum Scale (Diabetes Self-Management)
Gender	.08	.06	-.15**	.04	.00
Age	.05	.10	.10	.15*	.13*
Duration of Diabetes	.14*	.19**	.08	.13*	.19**
Comorbid Conditions	.16**	.13*	.04	.05	.15**
Illness Perceptions					
Timeline (acute/chronic)	.16**	.06	.08	.06	.14*
Consequences	.05	-.04	-.14*	.08	-.02
Personal control	.30**	.23**	.35**	.23**	.37**
Treatment control	.13*	.12*	.18**	.12*	.18**
Illness coherence	.17**	.19**	.15*	.13*	.22**
Timeline cyclical	-.04	-.06	-.15**	-.04	-.10
Emotional representations	.00	-.09	-.18**	-.04	-.11
Health Hardiness					
Health value	.49**	.51**	.44**	.36**	.62**
Internal health locus of control	.22**	.30**	.41**	.12*	.37**
External health locus of control	-.21**	-.32**	-.34**	-.24**	-.38**
Perceived health competence	.12*	.25**	.19**	.13*	.24**

Note. * $p < .05$; ** $p < .01$

(c) Relationship between demographic variables and overall diabetes self-management and its subscales

Gender and overall diabetes self-management and its subscales

The results as shown in Table 5 revealed a significant inverse relationship between gender and physical activity ($r = -.15, p < .01$) stating that men demonstrated high scores on physical activity. However, no significant relationship was observed between gender, glucose management, dietary control, health-care use and sum scale (overall diabetes self-management).

Age and overall diabetes self-management and its subscales

A significant positive relationship was observed between age and health-care use ($r = .15, p < .05$) and age and overall diabetes self-management ($r = .13, p < .05$) indicating that older age is related to increased overall diabetes self-management and health care-use. However, no significant relationship was observed between age and glucose management, dietary control and physical activity.

Duration of diabetes and overall diabetes self-management and its subscales

A significant positive relationship was noticed between duration of diabetes and glucose management ($r = .14, p < .05$); duration of diabetes and dietary control ($r = .19, p < .01$); duration of diabetes and health-care use ($r = .13, p < .05$); and duration of diabetes and overall diabetes self-management ($r = .19, p < .01$). This indicates that as duration of diabetes progresses, the glucose management, dietary control, health care-use and overall diabetes self-management is shown to improve. However no significant relationship was observed between diabetes duration and physical activity.

Comorbid conditions and overall diabetes self-management and its subscales

A significant positive relationship was observed between presence of comorbid conditions and glucose management ($r = .16, p < .01$); comorbid conditions and dietary control ($r = .13, p < .05$); comorbid conditions and overall diabetes self-management ($r = .15, p < .01$). This indicates that presence of comorbid conditions is associated with better glucose management, dietary control, and overall diabetes self-management. However, no significant correlation was observed between comorbid conditions and physical activity and health-care use.

(d) Relationship between illness perceptions, overall diabetes self-management and its subscales

Both significant positive and negative relationships were observed between illness perceptions and overall diabetes self-management and its subscales.

Timeline (acute/chronic), overall diabetes self-management and its subscales

The results from Table 5 revealed a significant positive relationship between timeline (acute/chronic) dimension and glucose management ($r = .16, p < .01$); timeline (acute/chronic) dimension and overall diabetes self-management ($r = .14, p < .05$). This implies that perceiving diabetes as chronic condition is associated with better glucose management and overall diabetes self-management. However, no significant relationship was noticed between timeline (acute/chronic) dimension and dietary control, physical activity and health-care use.

Consequences, overall diabetes self-management and its subscales

A significant inverse relationship was observed between consequences dimension and only one subscale of diabetes self-management i.e. physical activity ($r = -.14, p <$

.05) indicating that higher perceptions of diabetes with severe consequences is associated with decreased physical activity levels. The results indicated no significant correlations between consequences and glucose management, dietary control, health-care use and overall diabetes self-management.

Personal control, overall diabetes self-management and its subscales

It is seen from Table 5 that a significant positive relationship was observed between personal control dimension, diabetes self-management and all of its subscales— glucose management ($r = .30, p < .01$); dietary control ($r = .23, p < .01$); physical activity ($r = .35, p < .01$); health-care use ($r = .23, p < .01$); and overall diabetes self-management ($r = .37, p < .01$). This implies that higher perceptions of personal control or confidence in controlling diabetes is associated with improved glucose management, dietary control, physical activity, health-care use, and overall diabetes self-management.

Treatment control, overall diabetes self-management and its subscales

Treatment control showed similar trend as personal control. Results revealed a significant positive relationship between treatment control dimension, diabetes self-management and all of its subscales— glucose management ($r = .13, p < .05$); dietary control ($r = .12, p < .05$); physical activity ($r = .18, p < .01$); health-care use ($r = .12, p < .05$); and overall diabetes self-management ($r = .18, p < .01$). This implies that perceiving treatment as effective in controlling diabetes and delaying negative effects is associated with improved, glucose management, dietary control, physical activity, health-care use, and overall diabetes self-management.

Illness coherence, overall diabetes self-management and its subscales

Similar to personal and treatment control, illness coherence dimension also demonstrated a significant positive relationship with overall diabetes self-management and all of its subscales—glucose management ($r = .17, p < .01$); dietary control ($r = .19, p < .01$); physical activity ($r = .15, p < .05$); health-care use ($r = .13, p < .05$); and overall diabetes self-management ($r = .22, p < .01$). This implies that greater understanding (coherence) about diabetes is associated with improved overall diabetes self-management and its components— glucose management, dietary control, physical activity, and health-care use.

Timeline cyclical, overall diabetes self-management and its subscales

Results from Table 5 revealed a significant negative correlation between timeline cyclical dimension and physical activity ($r = -.15, p < .01$) indicating that perceiving diabetes as unstable condition is associated with lower physical activity levels and vice versa. However, no significant relationship was observed between timeline cyclical dimension and glucose management, dietary control, health-care use and overall diabetes self-management.

Emotional representations, overall diabetes self-management and its subscales

Similarly, to timeline cyclical dimension, emotional representations was observed to have a negative relationship with physical activity ($r = -.18, p < .01$) indicating that higher emotional worries due to diabetes are associated with lower physical activity levels and vice versa. However, no significant correlation was observed between

emotional representations and glucose management, dietary control, health-care use and overall diabetes self-management.

(e) Relationship between health hardiness, overall diabetes self-management and its subscales

Scales of health hardiness were observed to have both significant positive and negative relationship with overall diabetes self-management and all of its dimensions.

Health value, overall diabetes self-management and its subscales

A significant positive association was observed between health value and overall diabetes self-management and all of its subscales. A positive significant relationship was found between health value and glucose management ($r = .49, p < .01$); health value and dietary control ($r = .51, p < .01$); health value and physical activity ($r = .44, p < .01$); health value and health-care use ($r = .36, p < .01$); and health value and overall diabetes self-management ($r = .62, p < .01$). This implies that higher health value is associated with higher levels of glucose management, dietary control, physical activity, health-care use and overall diabetes self-management.

Internal health locus of control, overall diabetes self-management and its subscales

Results revealed a significant positive relationship between internal health locus of control and overall diabetes self-management and all of its subscales— glucose management ($r = .22, p < .01$); dietary control ($r = .30, p < .01$); physical activity ($r = .41, p < .01$); health-care use ($r = .12, p < .05$) and; overall diabetes self-management ($r = .37, p < .01$). This indicates that internal orientation towards health is associated with

higher levels of glucose management, dietary control, physical activity, health-care use, and overall diabetes self-management.

External health locus of control, overall diabetes self-management and its subscales

Results revealed a significant negative relationship between external health locus of control and overall diabetes self-management and all of its subscales— glucose management ($r = -.21, p < .01$); dietary control ($r = -.32, p < .01$); physical activity ($r = -.34, p < .01$); health-care use ($r = -.24, p < .01$) and; overall diabetes self-management ($r = -.38, p < .01$). This indicates that external orientation towards health is associated with lower levels of glucose management, dietary control, physical activity, health-care use, and overall diabetes self-management and vice versa.

Perceive health competence, overall diabetes self-management and its subscales

A significant positive association was observed between perceived health competence and glucose management ($r = .12, p < .05$); dietary control ($r = .25, p < .01$); physical activity ($r = .19, p < .01$); health-care use ($r = .13, p < .05$) and; overall diabetes self-management ($r = .24, p < .01$). This states that higher perceived health competence is associated with higher levels of glucose management, dietary control, physical activity, health-care use and overall diabetes self-management. Weak to moderately stronger correlations were observed between the predictor variables and criterion variable ranging from $r = -.14, p < .05$ to $r = .62, p < .01$. The correlation coefficients were higher between health hardiness scales and diabetes self-management and its subscales.

Predictors of Diabetes Self-Management

Basing on the findings of Pearson's correlation five hierarchical multiple regression analysis models were developed for diabetes self-management and its four subscales. All essential assumptions such as linearity, normality, homoscedasticity, and absence of multicollinearity were verified for each model. Demographic variables were entered in first model to partial out the variance explained by them. In second model illness perceptions were entered as they were diabetes specific and finally health hardiness scales were included in third block. This procedure was followed for all the five models. The results of these five separate models are presented in Table 6 to Table 10.

Role of Predictor Variables in Glucose Management

The hierarchical multiple regression analysis model was developed in respect to glucose management of diabetes self-management. From Table 5, it was found that duration of diabetes, comorbid conditions, illness perceptions (timeline (acute/chronic), personal control, treatment control, and illness coherence), and all scales of health hardiness (health value, internal health locus of control, external health locus of control and perceived health competence) had significant relationship with glucose management. Weak to moderately strong correlations were observed between the predictor variables and the criterion (glucose management) ranging from $r = -.21, p < .01$ to $r = .49, p < .01$, indicating that the data were suitable for examination through multiple linear regression. Tolerance values were found to be above .01 and VIF (variance inflation factor) was found to be below 10 indicating absence of multicollinearity. Therefore, above mentioned

variables were selected to be entered into the hierarchical multiple regression model to identify the predictors of glucose management.

Table 6

Summary Table of Hierarchical Multiple Regression Analysis for Demographic Variables (duration of diabetes and comorbid conditions), Illness Perceptions and Health Hardiness predicting Glucose Management

Model and predictor variable	R	R²	ΔR^2	B	SEB	β	t
Model 1	.20	.04**					
(C = 7.09, F=5.68**)							
Duration of diabetes				.00	.00	.12	1.97
Comorbid conditions				.64	.28	.14*	2.31
Model 2	.39	.15***	.11***				
(C = 2.82, F=8.34***)							
Duration of diabetes				.00	.00	.08	1.38
Comorbid conditions				.38	.27	.08	1.44
Timeline (acute/chronic)				.06	.02	.14*	2.40
Personal control				.14	.03	.31***	4.75
Treatment control				-.03	.04	-.05	-.80
Illness coherence				.04	.03	.09	1.60
Model 3	.56	.31***	.16***				
(C=1.71, F= 12.60***)							
Duration of diabetes				.00	.00	.01	.23
Comorbid conditions				.29	.25	.06	1.14
Timeline (acute/chronic)				.06	.02	.13*	2.38
Personal control				.06	.03	.13	1.80
Treatment control				-.03	.03	-.06	-.90
Illness coherence				.04	.03	.09	1.49
Health Value				1.60	.20	.63***	7.83
Internal health locus of control				-.73	.19	-.31***	-3.90
External health locus of control				.00	.19	.00	.01
Perceived health competence				-.08	.17	-.03	-.49

Note. C = Constant, $\Delta R^2 = R^2$ change, B = Unstandardized beta coefficient, SEB = Standardized error of beta, β = Standardized beta coefficient. * $p < .05$; ** $p < .01$; *** $p < .001$

From Table 6 it can be seen that, the significantly correlated predictors were entered hierarchically in three models— model 1 (duration of diabetes and comorbid conditions), model 2 (timeline (acute/chronic), personal control, treatment control, and illness coherence), and model 3 (health value, internal health locus of control, external health locus of control and perceived health competence) — in relation to glucose management.

In the first model of hierarchical multiple regression, two predictors were entered— duration of diabetes and comorbid conditions. The model 1 was statistically significant $F(2, 283) = 5.68; p < .01$ and explained 4% of significant proportion of variance ($Adjusted R^2 = .03$) in glucose management. From the analysis comorbid conditions ($\beta = .14, p < 0.05$) was found to be a significant predictor for glucose management. After entry of illness perceptions— timeline (acute/chronic), personal control, treatment control, and illness coherence at model 2 in addition to duration of diabetes and comorbid conditions, the model was found to be significant, $F(6, 279) = 8.34; p < .001$, and the model explained 11% additional significant proportion of variance ($R^2 Change = .11, p < 0.001$) amounting to total 15% significant proportion of variance of glucose management ($Adjusted R^2 = .13$). From the analysis, timeline (acute/chronic) and personal control were found to be the significant predictors for glucose management ($\beta = .14, p < 0.05$) and ($\beta = .31, p < 0.001$) in model 2.

After the entry of health hardiness scales— health value, internal health locus of control, external health locus of control and perceived health competence in model 3 in addition to duration of diabetes, comorbid conditions and illness perceptions, the model was found to be significant, $F(10, 275) = 12.60, p < 0.001$, and the model explained 16%

more significant proportion of variance ($R^2\text{Change} = .16, p < 0.001$) amounting to total 31% significant proportion of variance of glucose management ($Adjusted R^2 = .29$). The results revealed that in Model 3 timeline (acute/chronic) ($\beta = .13, p < 0.05$), health value ($\beta = .63, p < 0.001$), and internal health locus of control ($\beta = -.31, p < 0.001$) were found to be the significant predictors for glucose management. The result highlighted that comorbid conditions was significant predictor for glucose management in model 1, timeline (acute/chronic) and personal control were significant predictors for glucose management in Model 2, and timeline (acute/chronic), health value and internal health locus of control in final Model 3.

Role of Predictor Variables in Dietary Control

Likewise, the hierarchical multiple regression analysis model was developed in respect to dietary control of diabetes self-management. From Table 5, it was found that duration of diabetes, comorbid conditions, illness perceptions (personal control, treatment control, and illness coherence), and health hardiness scales (health value, internal health locus of control, external health locus of control and perceived health competence) had significant relationship with dietary control. The correlations between the predictor variables and the criterion (dietary control) were all weak to moderately strong, ranging from $r = -.32, p < .01$ to $r = .51, p < .01$, indicating that the data were suitable for examination through multiple linear regression. Tolerance values were found to be above .01 and VIF (variance inflation factor) was found to be below 10 indicating absence of multicollinearity. Therefore, above mentioned variables were selected to be entered into the hierarchical multiple regression model to identify the predictors of dietary control. As seen in Table 7, the significantly correlated predictors were entered hierarchically in three

models— model 1 (duration of diabetes and comorbid conditions), model 2 (personal control, treatment control, and illness coherence), and model 3 (health value, internal health locus of control, external health locus of control and perceived health competence) — in relation to dietary control.

Table 7

Summary Table of Hierarchical Multiple Regression Analysis for Demographic Variables (duration of diabetes and comorbid conditions), Illness Perceptions and Health Hardiness predicting Dietary Control

Model and predictor variable	R	R²	ΔR^2	B	SEB	β	t
Model 1 (C = 5.88, F=6.68**)	.21	.04**					
Duration of diabetes				.00	.00	.17**	2.84
Comorbid conditions				.51	.30	.10	1.71
Model 2 (C = 3.04, F=6.99***)	.33	.11***	.07***				
Duration of diabetes				.00	.00	.17**	2.96
Comorbid conditions				.38	.29	.08	1.33
Personal control				.09	.03	.20**	3.00
Treatment control				-.01	.04	-.01	-.17
Illness coherence				.06	.03	.13*	2.11
Model 3 (C=2.15, F= 14.70***)	.57	.32***	.21***				
Duration of diabetes				.00	.00	.08	1.60
Comorbid conditions				.22	.27	.04	.82
Personal control				-.03	.03	-.07	-.94
Treatment control				-.02	.04	-.03	-.56
Illness coherence				.01	.03	.03	.50
Health Value				1.56	.22	.57***	7.15
Internal health locus of control				-.39	.20	-.15	-1.94
External health locus of control				-.36	.21	-.11	-1.76
Perceived health competence				.44	.18	.13*	2.45

Note. C = Constant, $\Delta R^2 = R^2$ change, B = Unstandardized beta coefficient, SEB = Standardized error of beta, β = Standardized beta coefficient. * $p < .05$; ** $p < .01$; *** $p < .001$

In the first model of hierarchical multiple regression, two predictors were entered— duration of diabetes and comorbid conditions. The model 1 was statistically significant $F(2, 283) = 6.68; p < .01$ and explained 4% of significant proportion of variance ($Adjusted R^2 = .04$) in dietary control. From the analysis only duration of diabetes was found to be a significant predictor for dietary control ($\beta = .17, p < 0.01$). After entry of illness perceptions— personal control, treatment control, and illness coherence in model 2 in addition to duration of diabetes and comorbid conditions, the model was found to be significant, $F(5, 280) = 6.99; p < .001$, and the model explained 7% additional significant proportion of variance ($R^2 Change = .07, p < 0.001$) amounting to total 11% significant proportion of variance of dietary control ($Adjusted R^2 = .09$). From the analysis, duration of diabetes, personal control and illness coherence were found to be significant predictors for dietary control ($\beta = .17, p = 0.01$), ($\beta = .20, p = 0.01$) and ($\beta = .13, p = 0.05$) in model 2.

After the entry of health hardiness scales— health value, internal health locus of control, external health locus of control and perceived health competence in model 3 in addition to duration of diabetes, comorbid conditions, and illness perceptions the model was found to be statistically significant, $F(9, 276) = 14.70, p < 0.001$, and the model explained 21% more significant proportion of variance ($R^2 Change = .21, p < 0.001$) amounting to total 32% significant proportion of variance of dietary control ($Adjusted R^2 = .30$). The result highlighted that only health value ($\beta = .57, p < 0.001$) and perceived health competence ($\beta = .13, p < 0.05$) were the significant predictors for dietary control in model 3. The result highlighted that duration of diabetes was the significant predictor for

dietary control in Model 1, duration of diabetes, personal control and illness coherence in Model 2, and health value and perceived health competence in Model 3.

Role of Predictor Variables in Physical Activity

Likewise, the hierarchical multiple regression analysis model was developed in respect to physical activity subscale of diabetes self-management. From Table 5, it was found that gender, illness perceptions (consequences, personal control, treatment control, illness coherence, timeline cyclical and emotional representations), and health hardiness scales (health value, internal health locus of control, external health locus of control and perceived health competence) had significant relationship with physical activity. All weak to moderately strong correlations were observed between the predictor variables and the criterion (physical activity) ranging from $r = -.14, p < .05$ to $r = .44, p < .01$, indicating that the data were suitable for examination through multiple linear regression. Tolerance values were found to be above .01 and VIF (variance inflation factor) was found to be below 10 indicating absence of multicollinearity. Therefore, above mentioned variables were selected to be entered into the hierarchical multiple regression model to identify the predictors of physical activity. As seen in Table 8, the significantly correlated predictors were entered hierarchically in three models— model 1 (gender), model 2 (consequences, personal control, treatment control, illness coherence, timeline cyclical and emotional representations), and model 3 (health value, internal health locus of control, external health locus of control and perceived health competence) — in relation to physical activity.

Table 8

Summary Table of Hierarchical Multiple Regression Analysis for Demographic Variables (gender), Illness Perceptions and Health Hardiness predicting Physical Activity

Model and predictor variable	<i>R</i>	<i>R</i>²	ΔR^2	<i>B</i>	<i>SEB</i>	β	<i>t</i>
Model 1 (<i>C</i> = 6.43, <i>F</i> =7.01 **)	.15	.02**					
Gender				-.98	.37	-.15**	-2.65
Model 2 (<i>C</i> = 3.64, <i>F</i> =8.36 ***)	.42	.17***	.15***				
Gender				-.78	.36	-.12*	-2.18
Consequences				-.00	.03	-.00	-.08
Personal control				.21	.04	.34***	5.26
Treatment control				.00	.05	.00	-.01
Illness coherence				.00	.04	-.00	-.01
Timeline cyclical				-.06	.05	-.07	-1.21
Emotional representations				-.05	.03	-.13*	-2.06
Model 3 (<i>C</i> = 1.80, <i>F</i> = 9.10***)	.52	.26***	.09***				
Gender				-.71	.34	-.11*	-2.09
Consequences				.02	.03	.04	.70
Personal control				.07	.05	.12	1.61
Treatment control				-.01	.05	-.01	-.22
Illness coherence				-.04	.04	-.06	-1.07
Timeline cyclical				-.06	.04	-.07	-1.25
Emotional representations				-.04	.03	-.09	-1.47
Health Value				.92	.30	.25**	3.05
Internal health locus of control				.31	.30	.09	1.02
External health locus of control				-.38	.28	-.09	-1.36
Perceived health competence				.39	.25	.09	1.54

Note. *C* = Constant, $\Delta R^2 = R^2$ change, *B* = Unstandardized beta coefficient, *SEB* = Standardized error of beta, β = Standardized beta coefficient. **p* < .05; ***p* < .01; ****p* < .001

In the first model of hierarchical multiple regression, only one predictor was entered— gender. The model 1 was statistically significant $F(1, 284) = 7.01, p < .01$ and explained 2% of significant proportion of variance ($Adjusted R^2 = .02$) in physical activity. From the analysis gender was observed to be a significant predictor for physical activity ($\beta = -.15, p < 0.01$). After entry of illness perceptions— consequences, personal control, treatment control, illness coherence, timeline cyclical and emotional representations in model 2 in addition to gender, the model was found to be significant, $F(7, 278) = 8.36; p < .001$, and the model explained 15% more significant proportion of variance ($R^2 Change = .15, p < 0.001$) amounting to total 17% significant proportion of variance of physical activity ($Adjusted R^2 = .15$). From the analysis, gender ($\beta = -.12, p < 0.05$), personal control ($\beta = .34, p = 0.001$) and emotional representations ($\beta = -.13, p = 0.05$) were found to be significant predictors for physical activity in the model 2.

After the entry of health hardiness scales— health value, internal health locus of control, external health locus of control and perceived health competence in model 3 in addition to gender and illness perceptions the model was found to be significant, $F(11, 274) = 9.10, p < 0.001$, and the model explained 9% more significant proportion of variance ($R^2 Change = .09, p < 0.001$) amounting to total 26% significant proportion of variance of physical activity ($Adjusted R^2 = .24$). The results revealed that in Model 3 only gender ($\beta = -.11, p < 0.05$) and health value ($\beta = .25, p < 0.01$) were observed to be significant predictors for physical activity. The result highlighted that gender was the significant predictor for physical activity in Model 1, gender, personal control, and emotional representations were significant predictors for physical activity, in Model 2,

and gender and health value in Model 3. It can be observed that gender was consistent significant predictor of physical activity in all the three models.

Role of Predictor Variables in Health-Care Use

Likewise, the hierarchical multiple regression analysis model was developed in respect to health-care use subscale of diabetes self-management. From Table 5, it was found that age, duration of diabetes, illness perceptions (personal control, treatment control, and illness coherence), and health hardiness scales (health value, internal health locus of control, external health locus of control and perceived health competence) had significant relationship with health-care use. All weak to moderately strong correlations were observed between the predictor variables and the criterion (health-care use) ranging from $r = -.24, p < .01$ to $r = .36, p < .01$, indicating that the data were suitable for examination through multiple linear regression. Tolerance values were found to be above .01 and VIF (variance inflation factor) was found to be below 10 indicating absence of multicollinearity. Therefore, above mentioned variables were selected to be entered into the hierarchical regression model to identify the predictors of health-care use. As seen in Table 9, the significantly correlated predictors were entered hierarchically in three models— model 1 (age and duration of diabetes), model 2 (personal control, treatment control, and illness coherence), and model 3 (health value, internal health locus of control, external health locus of control and perceived health competence)— in relation to health-care use.

Table 9

Summary Table of Hierarchical Regression Analysis for Demographic Variables (age and duration of diabetes), Illness Perceptions and Health Hardiness predicting Health-Care Use

Model and predictor variable	R	R²	ΔR^2	B	SEB	β	t
Model 1 (<i>C = 5.55, F=3.95*</i>)	.16	.03*					
Age				.02	.01	.11	1.65
Duration of diabetes				.00	.00	.08	1.15
Model 2 (<i>C = 2.71, F=5.51 ***</i>)	.30	.09***	.06***				
Age				.03	.01	.13	1.93
Duration of diabetes				.00	.00	.07	1.13
Personal control				.10	.03	.22**	3.31
Treatment control				.00	.04	.00	.02
Illness coherence				.03	.03	.07	1.14
Model 3 (<i>C = 3.22, F = 8.17***</i>)	.46	.21***	.12***				
Age				.03	.01	.14*	2.24
Duration of diabetes				.00	.00	.00	.04
Personal control				.05	.03	.12	1.55
Treatment control				.00	.04	.00	.08
Illness coherence				.02	.03	.04	.60
Health Value				1.25	.23	.47***	5.52
Internal health locus of control				-.94	.21	-.38***	-4.51
External health locus of control				-.38	.21	-.12	-1.79
Perceived health competence				.12	.18	.04	.69

Note. *C* = Constant, $\Delta R^2 = R^2$ change, *B* = Unstandardized beta coefficient, *SEB* = Standardized error of beta, β = Standardized beta coefficient. * $p < .05$; ** $p < .01$; *** $p < .001$

In the first model of hierarchical multiple regression, two predictors were entered— age and duration of diabetes. The model 1 was statistically significant $F(2, 283) = 3.95, p < .05$ and explained 3% of significant proportion of variance ($Adjusted R^2 = .02$) in health-care use. After entry of illness perceptions—personal control, treatment control, and illness coherence in model 2 in addition to age and duration of diabetes, the model was found to be significant, $F(5, 280) = 5.51; p < .001$, and the model explained 6% more significant proportion of variance ($R^2Change = .06, p < 0.001$) amounting to total 9% significant proportion of variance of health-care use ($Adjusted R^2 = .07$). From the analysis, only personal control ($\beta = .22, p < 0.01$) was found to be significant predictor for health care-use in the model 2.

After the entry of health hardiness scales— health value, internal health locus of control, external health locus of control and perceived health competence in model 3 in addition to age and duration of diabetes and illness perceptions the model was observed to be significant, $F(9, 276) = 8.17, p < 0.001$, and the model explained 12% more significant proportion of variance ($R^2Change = .12, p < 0.001$) amounting to total 21% significant proportion of variance of health-care use ($Adjusted R^2 = .18$). The results revealed that in Model 3 age ($\beta = .14, p < 0.05$), health value ($\beta = .47, p < 0.001$) and internal health locus of control ($\beta = -.38, p < 0.001$) were observed to be significant predictors for health care-use in the model 3. The result highlighted that only personal control was the significant predictor for health care-use in Model 2, and age, health value and internal health locus of control in Model 3.

Role of Predictor Variables in Overall Diabetes Self-Management (sum scale)

From Table 5, it was found that age, duration of diabetes, comorbid conditions, illness perceptions (timeline acute/chronic, personal control, treatment control, and illness coherence), and health hardiness scales (health value, internal health locus of control, external health locus of control and perceived health competence) had significant relationship with overall diabetes self-management. All weak to moderately strong correlations were observed between the predictor variables and the criterion (overall diabetes self-management) ranging from $r = -.38, p < .01$ to $r = .62, p < .01$, indicating that the data were suitable for examination through multiple linear regression. Tolerance values were found to be above .01 and VIF (variance inflation factor) was found to be below 10 indicating absence of multicollinearity. Therefore, above mentioned variables were selected to be entered into the hierarchical multiple regression model to identify the predictors of overall diabetes self-management.

As seen in Table 10, the significantly correlated predictors were entered hierarchically in three models— model 1 (age, duration of diabetes, and comorbid conditions), model 2 (timeline (acute/chronic), personal control, treatment control, and illness coherence), and model 3 (health value, internal health locus of control, external health locus of control and perceived health competence)— in relation to overall diabetes self-management.

Table 10

Summary Table of Hierarchical Regression Analysis for Demographic Variables (age, duration of diabetes and comorbid conditions), Illness Perceptions and Health Hardiness predicting overall Diabetes Self-Management

Model and predictor variable	<i>R</i>	<i>R</i> ²	ΔR^2	<i>B</i>	<i>SEB</i>	β	<i>t</i>
Model 1 (<i>C</i> = 5.91, <i>F</i> =5.10**)	.23	.05**					
Age				.01	.01	.05	.72
Duration of diabetes				.00	.00	.14*	2.11
Comorbid conditions				.46	.23	.12*	2.00
Model 2 (<i>C</i> = 1.77, <i>F</i> =10.82***)	.46	.21***	.16***				
Age				.01	.01	.07	1.06
Duration of diabetes				.00	.00	.12	1.83
Comorbid conditions				.24	.21	.06	1.13
Timeline (acute/chronic)				.03	.02	.09	1.64
Personal control				.14	.02	.37***	5.89
Treatment control				-.02	.03	-.04	-.61
Illness coherence				.05	.02	.12*	2.18
Model 3 (<i>C</i> = 1.21, <i>F</i> = 20.21***)	.67	.44***	.23***				
Age				.01	.01	.06	1.14
Duration of diabetes				.00	.00	.03	.56
Comorbid conditions				.13	.19	.03	.70
Timeline (acute/chronic)				.03	.02	.08	1.57
Personal control				.03	.02	.09	1.47
Treatment control				-.03	.03	-.06	-1.02
Illness coherence				.02	.02	.04	.80
Health Value				1.38	.15	.64***	8.90
Internal health locus of control				-.41	.14	-.21**	-2.92
External health locus of control				-.25	.15	-.10	-1.71
Perceived health competence				.24	.12	.10	1.90

Note. *C* = Constant, $\Delta R^2 = R^2$ change, *B* = Unstandardized beta coefficient, *SEB* = Standardized error of beta, β = Standardized beta coefficient. **p*< .05; ***p*< .01; ****p*< .001

In the first model of hierarchical multiple regression, three predictors were entered— age, duration of diabetes, and comorbid conditions. The model 1 was statistically significant $F(3, 282) = 5.10; p < .01$ and explained 5% of significant proportion of variance ($Adjusted R^2 = .04$) in overall diabetes self-management. From the analysis, duration of diabetes ($\beta = .14, p < 0.05$) and comorbid conditions ($\beta = .12, p < 0.05$) were found to be the significant predictors for overall diabetes self-management in the model 1. After entry of illness perceptions— timeline (acute/chronic), personal control, treatment control, and illness coherence at model 2 in addition to age, duration of diabetes and comorbid conditions, the model was observed to be significant, $F(7, 278) = 10.82; p < .001$, and the model explained 16% more significant proportion of variance ($R^2 Change = .16, p < 0.001$) amounting to total 21% significant proportion of variance of overall diabetes self-management ($Adjusted R^2 = .19$). From the analysis, only personal control ($\beta = .37, p < 0.001$) and illness coherence ($\beta = .12, p < 0.05$) were found to be significant predictors for overall diabetes self-management in the model 2.

After the entry of health hardiness scales— health value, internal health locus of control, external health locus of control and perceived health competence at model 3 in addition to demographics (age, duration of diabetes, and comorbid conditions) and illness perceptions the model was found to be significant, $F(11, 274) = 20.21, p < 0.001$, and explained 23% more significant proportion of variance ($R^2 Change = .23, p < 0.001$) amounting to total 44% significant proportion of variance of overall diabetes self-management ($Adjusted R^2 = .43$). The results revealed that in Model 3 only health value ($\beta = .64, p < 0.001$) and internal health locus of control ($\beta = -.21, p < 0.01$) were observed to be significant predictors for overall diabetes self-management. The results highlighted

that duration of diabetes and comorbid conditions were significant predictors of overall diabetes self-management in model 1, personal control and illness coherence were significant predictors for overall diabetes self-management in Model 2, and health value and internal health locus of control in Model 3.

Causes of Diabetes

The third section of revised illness perception questionnaire (IPQ-R) presents 18 causes and requests participants' degree of agreement on a 5-point Likert scale. The frequency and percentage of agreement for different causes reported by participants are described in Table 11. As suggested by authors of revised illness perception questionnaire (Moss-Morris et al., 2002), principal component analysis was done, however, no satisfactory scales emerged suggesting that different causal beliefs did not cohere.

Table 11

Frequency Distribution of the Participants' of the Study in terms of 18 Causes

S.no	Causes	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1	Stress or worry	29 (10.1)	9 (3.1)	82 (28.7)	43(15.0)	123(43.0)
2	Hereditary-it runs in my family	36 (12.6)	15 (5.2)	70 (24.5)	38(13.3)	127(44.4)
3	A germ or virus	120 (42.0)	26 (9.1)	132 (46.2)	4 (1.4)	4 (1.4)
4	Diet or eating habits	58 (20.3)	12 (4.2)	105 (36.7)	47(16.4)	64 (22.4)
5	Chance or bad luck	99 (34.6)	20 (7.0)	124 (43.3)	24 (8.4)	19 (6.6)
6	Poor medical care in my past	102 (35.7)	22 (7.7)	122 (42.7)	20 (7.0)	20 (7.0)
7	Pollution in the environment	122 (42.7)	22 (7.7)	120 (42.0)	11 (3.8)	11 (3.8)
8	My own behaviour	100 (35.0)	18 (6.3)	120 (42.0)	27 (9.4)	21 (7.3)
9	My mental attitude e.g. thinking about life negatively	83 (29.0)	21 (7.3)	118 (41.3)	34(11.9)	30 (10.5)
10	Family problems or worries	67 (23.4)	19 (6.6)	111 (38.8)	37(12.9)	52 (18.2)
11	Overwork	100 (35.0)	17 (5.9)	117 (40.9)	30(10.5)	22 (7.7)
12	My emotional state e.g. feeling down, lonely, anxious, empty	89 (31.1)	10 (3.5)	118 (41.3)	38(13.3)	31 (10.8)
13	Ageing	67 (23.4)	23 (8.0)	114 (39.9)	43(15.0)	39 (13.6)
14	Alcohol	105 (36.7)	24 (8.4)	116 (40.6)	17 (5.9)	24 (8.4)
15	Smoking	111 (38.8)	27 (9.4)	116 (40.6)	15 (5.2)	17 (5.9)
16	Accident or injury	126 (44.1)	26 (9.1)	114 (39.9)	8 (2.8)	12 (4.2)
17	My personality	111 (38.8)	24 (8.4)	125 (43.7)	11 (3.8)	15 (5.2)
18	Altered immunity	94 (32.9)	27 (9.4)	122 (42.7)	21 (7.3)	22 (7.7)

Note. Frequency (percentage)

Table 11 presents frequency and percentage of participants reporting their agreement towards 18 causes on a five-point Likert scale. It was found from table 11 that while 123 (43%) participants strongly agreed to the cause ‘stress or worry’, 29 (10.1%) strongly disagreed, and 82 (28.7%) remained neutral. For cause ‘hereditary’ 127 (44.4%) participants strongly agreed while 36 (12.6%) strongly disagreed and 70 (24.5%) did not agree or disagree to it. ‘Germ or virus’ cause was strongly agreed by 4 (1.4%) participants, strongly disagreed by 120 (42%), whereas 132 (46.2%) did not agree or disagree to it. ‘Diet or eating habits’ cause was strongly agreed by 64 (22.4%) participants, strongly disagreed by 58 (20.3%), whereas 105 (36.7%) remained neutral. ‘Chance or bad luck’ cause was strongly agreed by 19 (6.6%) participants, strongly disagreed by 99 (34.6%), whereas 124 (43.3%) did not agree or disagree to it.

For cause ‘poor medical care in my past’ 20 (7.0%) participants strongly agreed while 102 (35.7%) strongly disagreed and 122 (42.7%) did not agree or disagree to it. For cause ‘pollution in the environment’ 11 (3.8%) participants strongly agreed while 122(42.7%) strongly disagreed and 120 (42%) did not agree or disagree to it. For cause ‘my own behavior’ 21 (7.3%) participants strongly agreed while 100 (35%) strongly disagreed and 120 (42%) did not agree or disagree to it. ‘My mental attitude’ cause was strongly agreed by 30 (10.5%) participants, strongly disagreed by 83 (29%), whereas 118 (41.3%) did not agree or disagree. It was found from the table that while 52 (18.2%) participants strongly agreed to the cause ‘family problems or worries’, 67 (23.4%) strongly disagreed, and 111 (38.8%) remained neutral. And 22 (7.7%) participants strongly agreed to the cause ‘overwork’, 100 (35%) strongly disagreed, and 117 (40.9%) remained neutral. It can be observed that 31 (10.8%) participants strongly agreed to the

cause 'my emotional state', 89 (31.1%) strongly disagreed, and 118 (41.3%) remained neutral. Similarly 39 (13.6%) participants strongly agreed to the cause 'ageing', 67 (23.4%) strongly disagreed, and 114 (39.9%) remained neutral. For cause 'alcohol' 24 (8.4%) participants strongly agreed while 105(36.7%) strongly disagreed and 116 (40.6%) did not agree or disagree to it. For cause 'smoking' 17 (5.9%) participants strongly agreed while 111(38.8%) strongly disagreed and 116 (40.6%) did not agree or disagree to it. For cause 'accident or injury' 12 (4.2%) participants strongly agreed while 126 (44.1%) strongly disagreed and 114 (39.9%) did not agree or disagree to it. For cause 'my personality' 15 (5.2%) participants strongly agreed while 111 (38.8%) strongly disagreed and 125 (43.7%) did not agree or disagree to it. Finally, for cause 'altered immunity' 22 (7.7%) participants strongly agreed while 94 (32.9%) strongly disagreed and 122 (42.7%) remained neutral.

The most strongly agreed causes of diabetes were hereditary, stress or worry, diet or eating habits, and family problems or worries. The least strongly agreed causes included germ or virus, and pollution in the environment. Participants' responses towards 18 causes on five-point Likert scale are depicted graphically in figure 3 to 20.

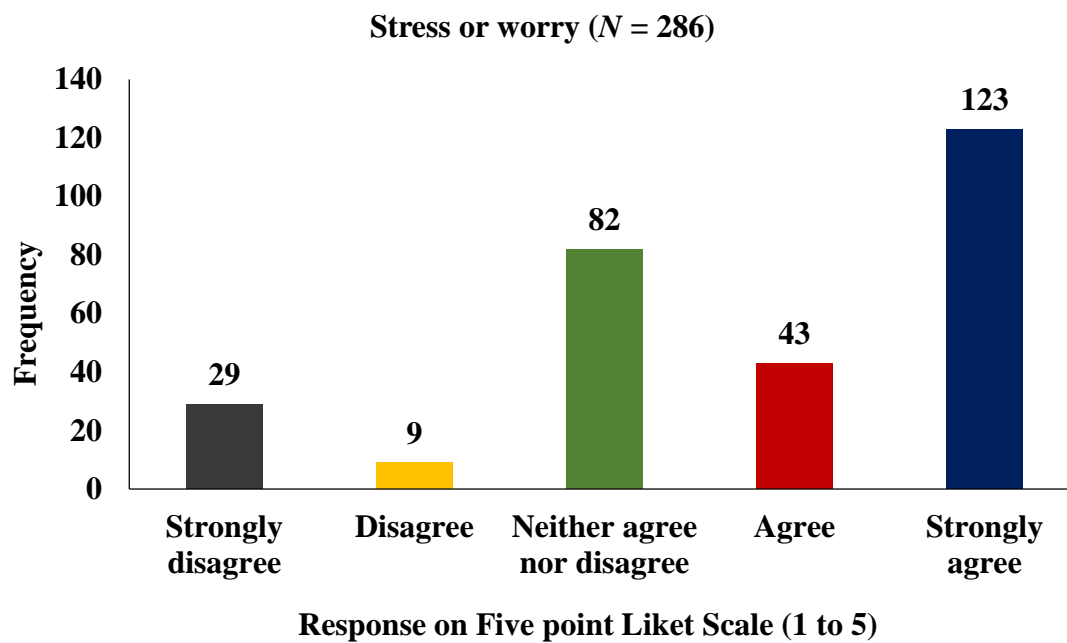


Figure 3. Bar graph presenting participants' responses to cause 'stress or worry'

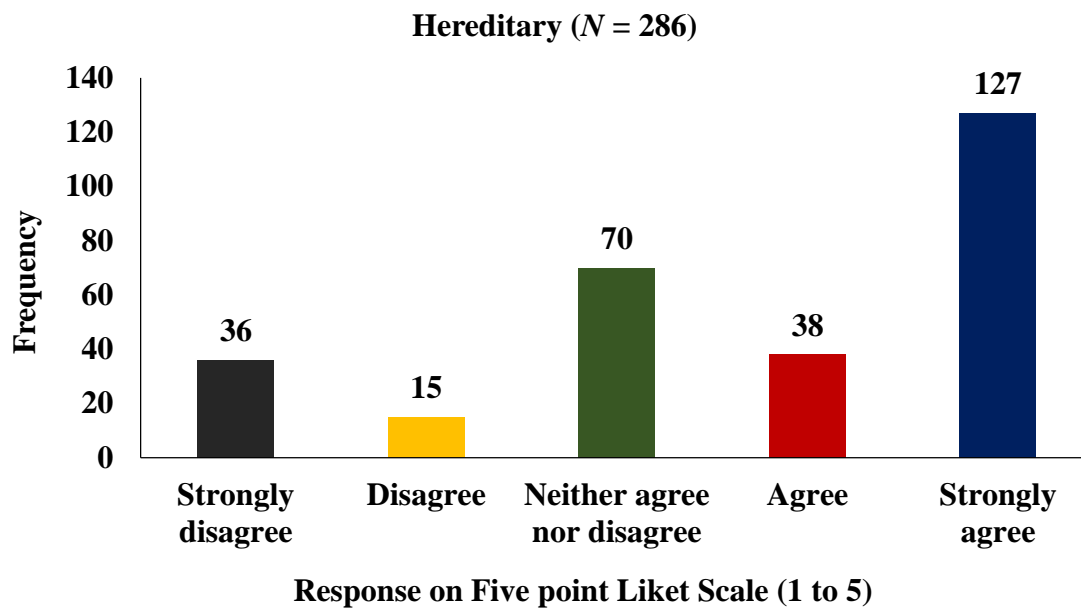


Figure 4. Bar graph presenting participants' responses to cause 'hereditary'

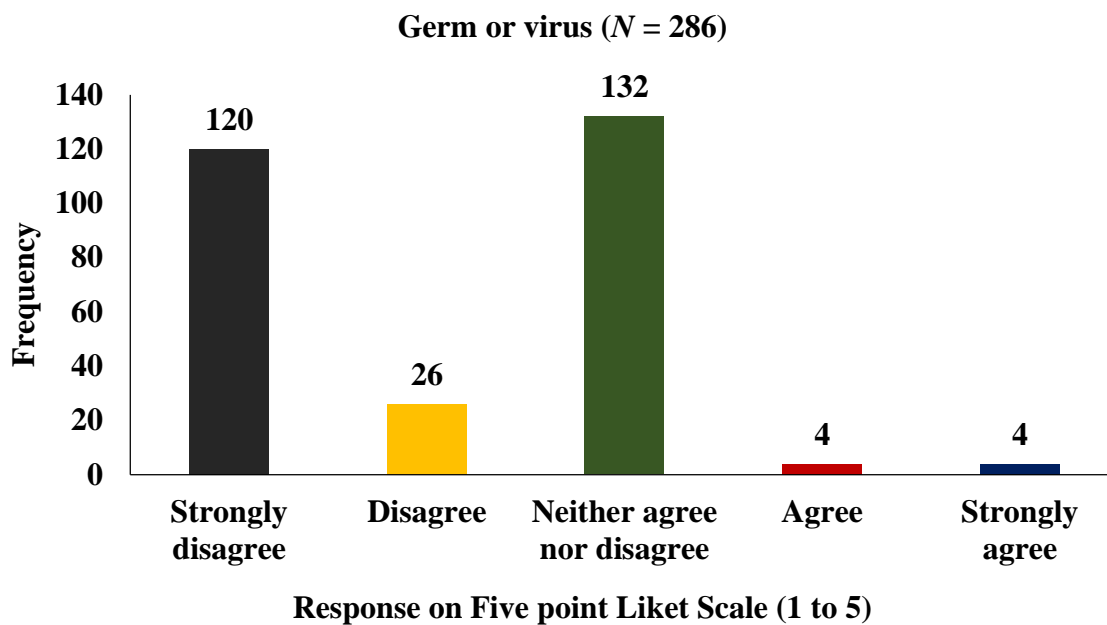


Figure 5. Bar graph presenting participants' responses to cause 'germ or virus'

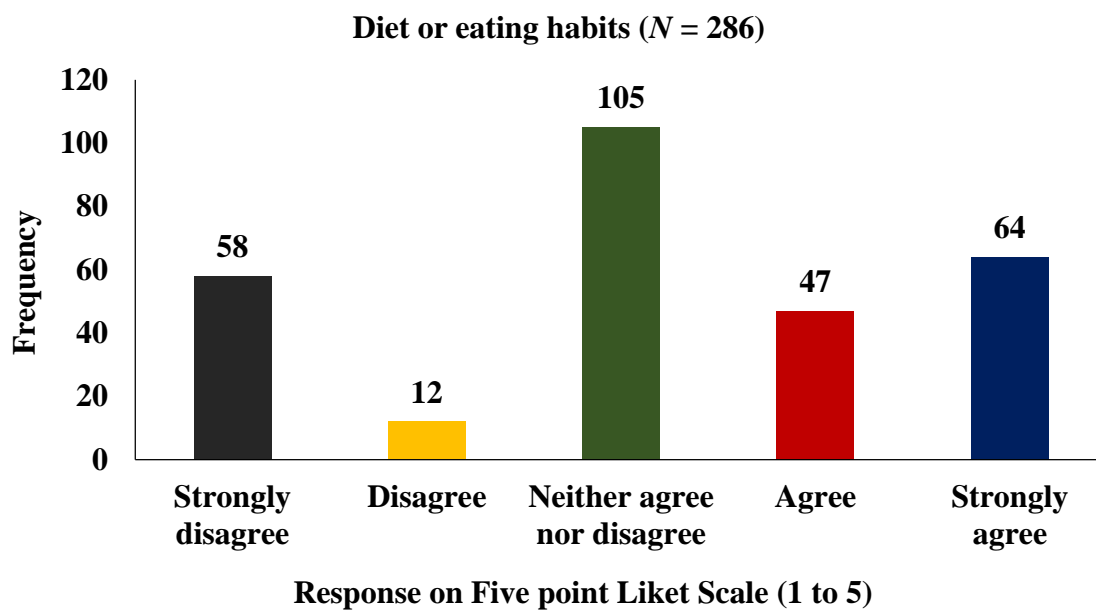


Figure 6. Bar graph presenting participants' responses to cause 'diet or eating habits'

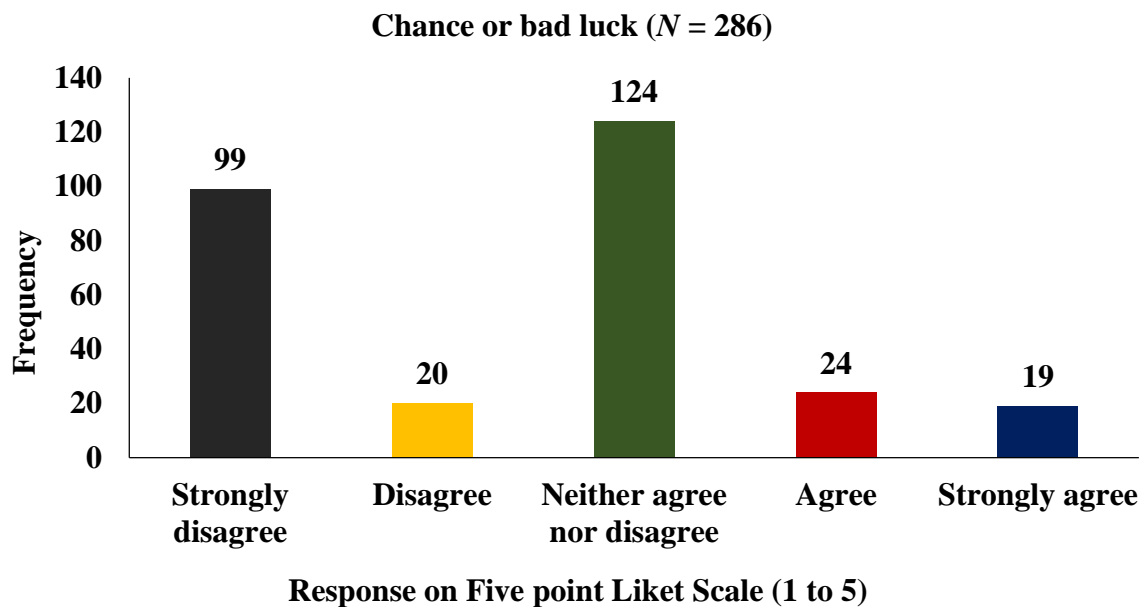


Figure 7. Bar graph presenting participants' responses to cause 'chance or bad luck'

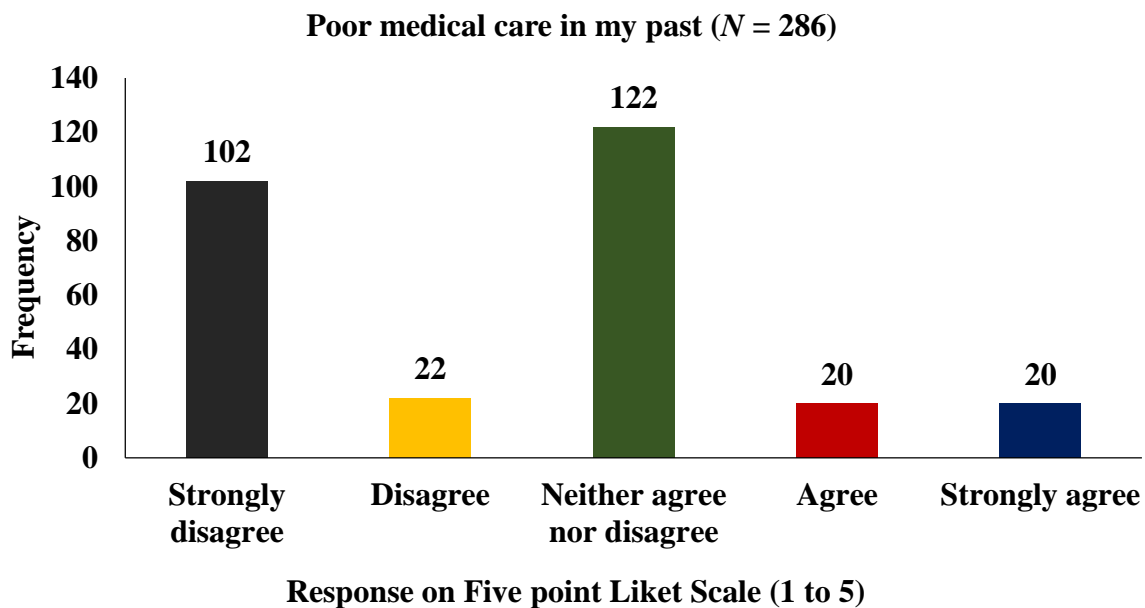


Figure 8. Bar graph presenting participants' responses to cause 'poor medical care in my past'

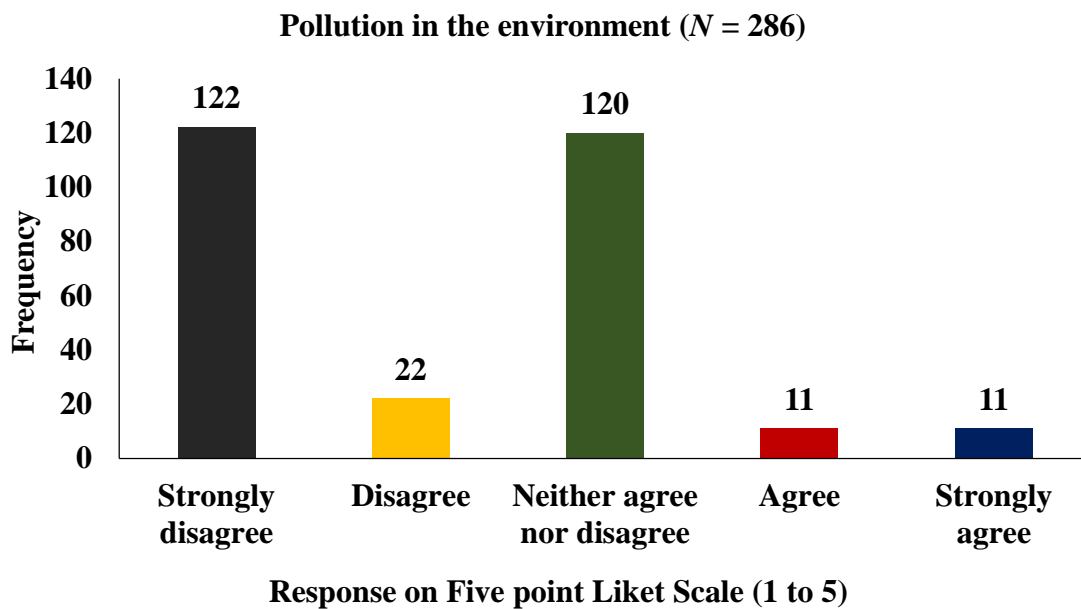


Figure 9. Bar graph presenting participants' responses to cause 'pollution in the environment'

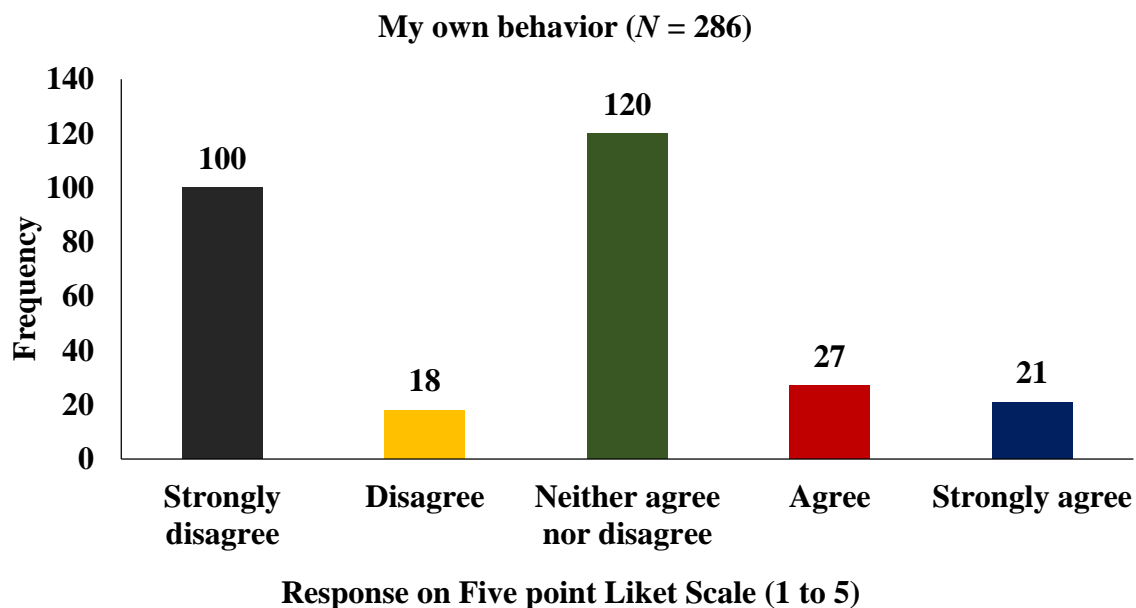


Figure 10. Bar graph presenting participants' responses to cause 'my own behavior'

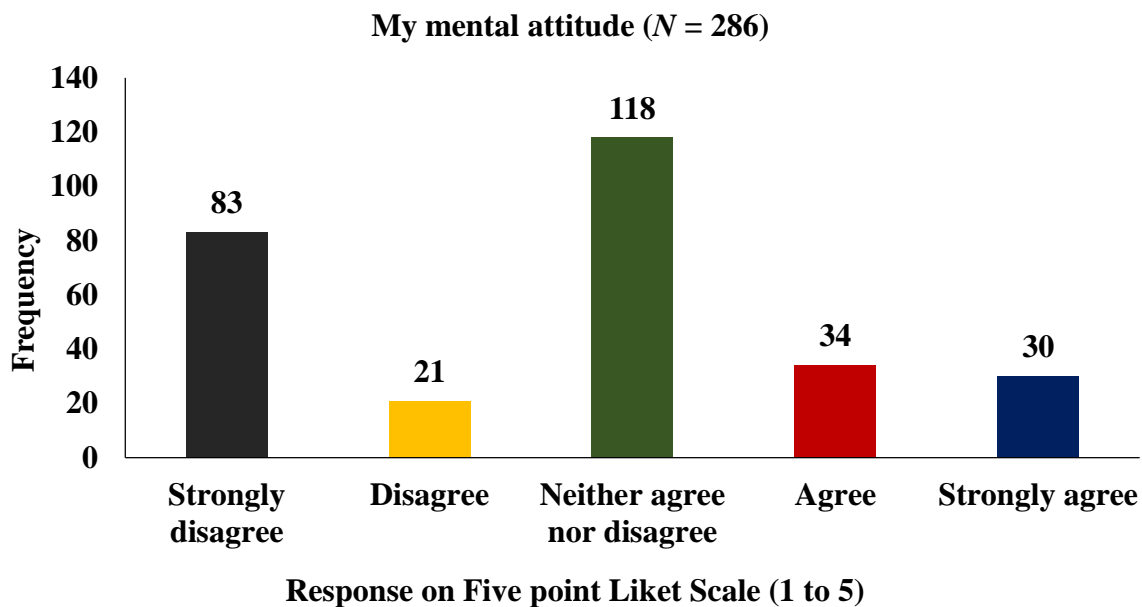


Figure 11. Bar graph presenting participants' responses to cause 'my mental attitude'

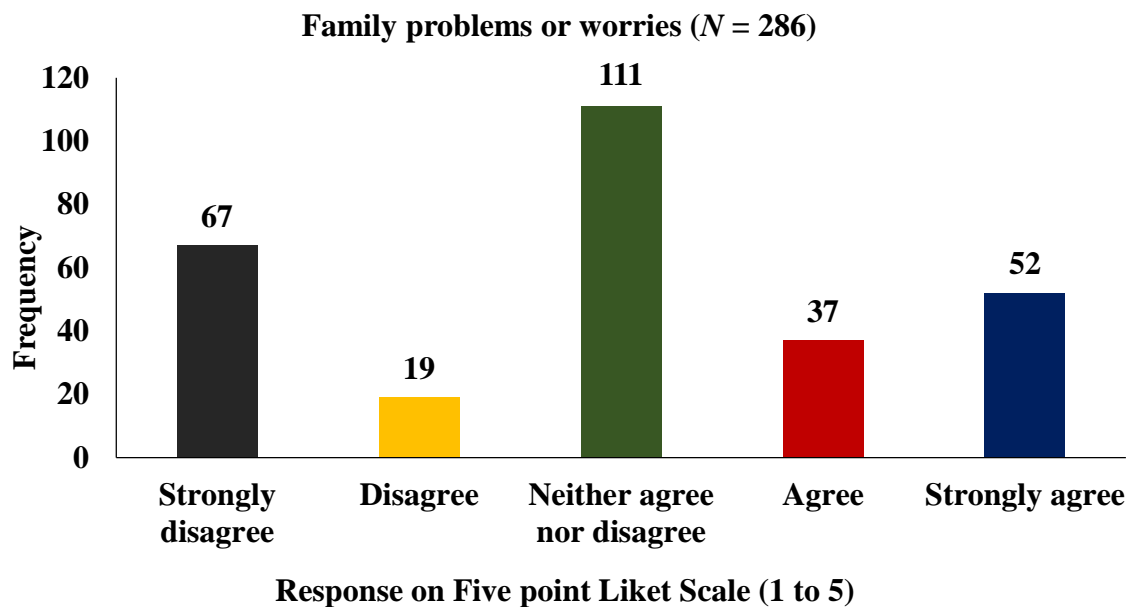


Figure 12. Bar graph presenting participants' responses to cause 'family problems or worries'

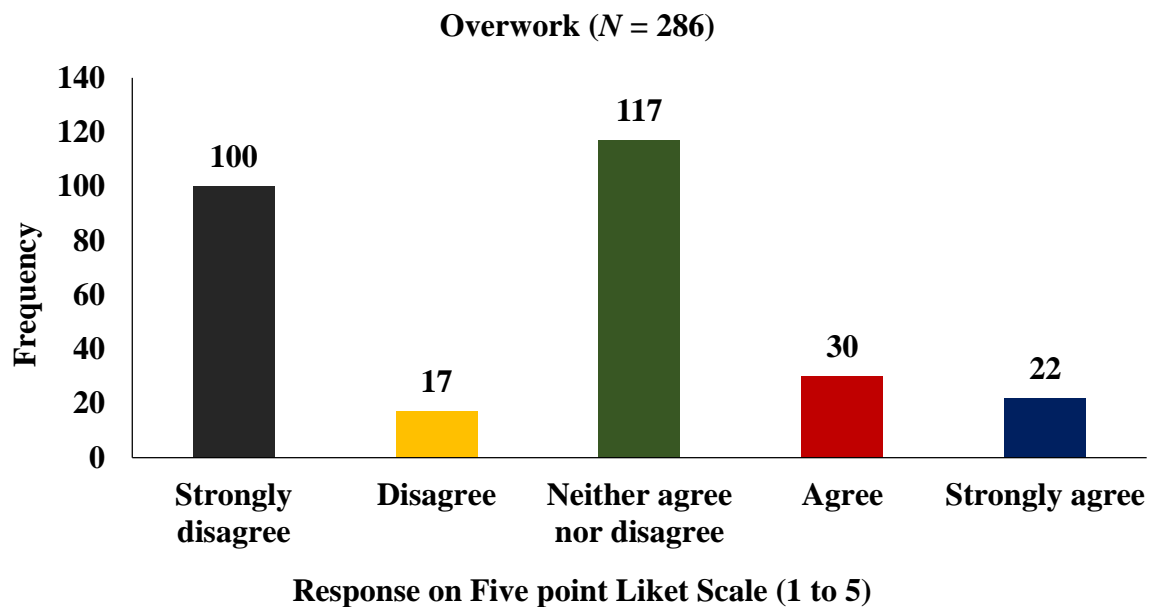


Figure 13. Bar graph presenting participants' responses to cause 'overwork'

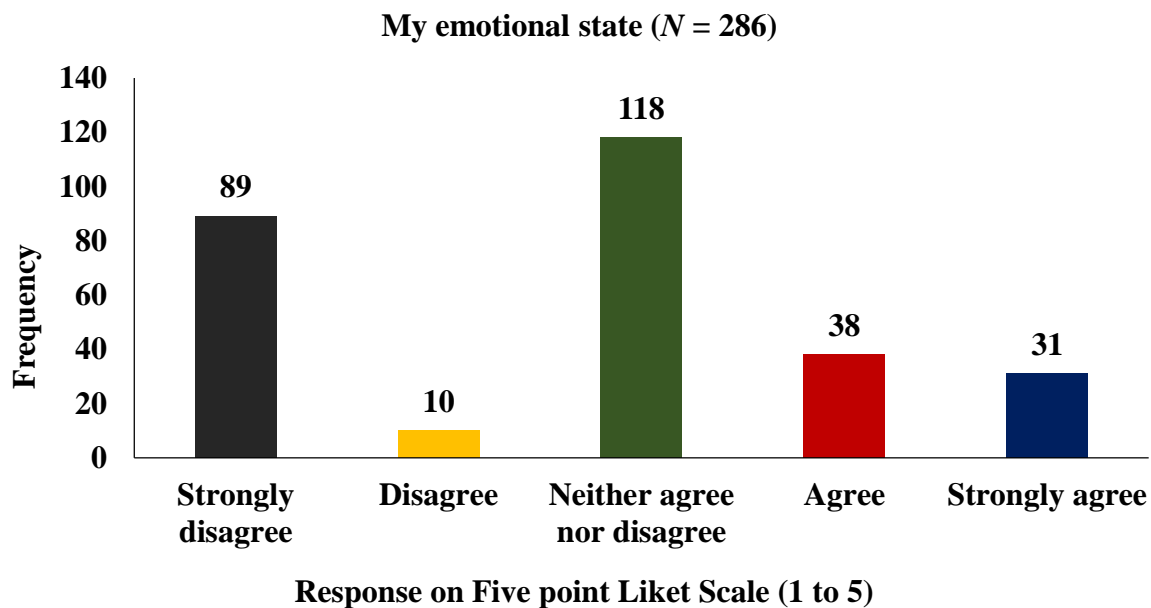


Figure 14. Bar graph presenting participants responses to cause 'my emotional state'

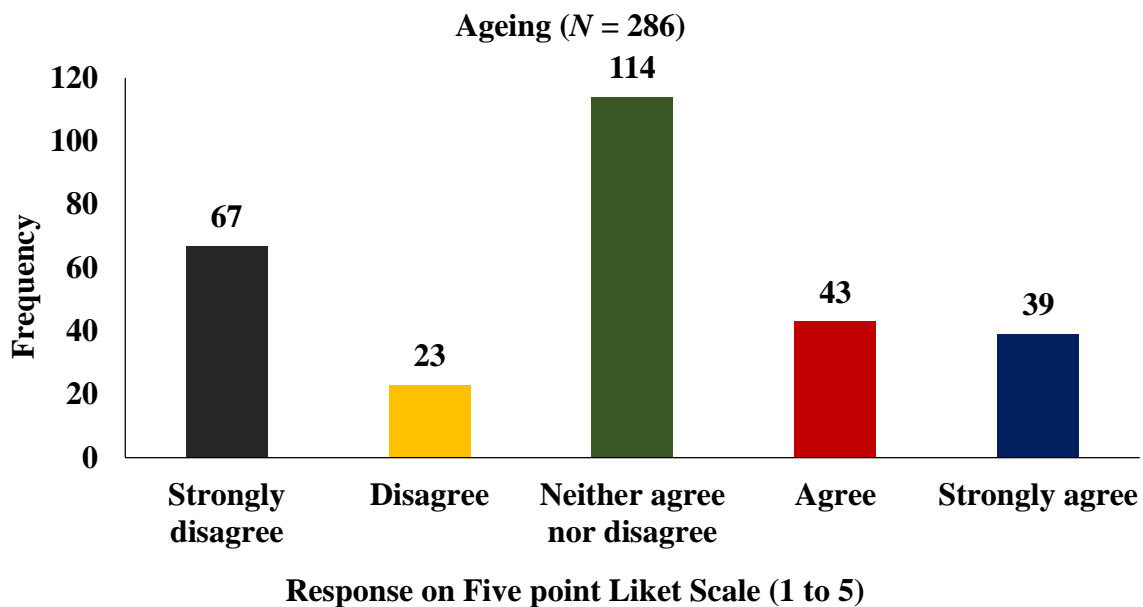


Figure 15. Bar graph presenting participants' responses to cause 'ageing'

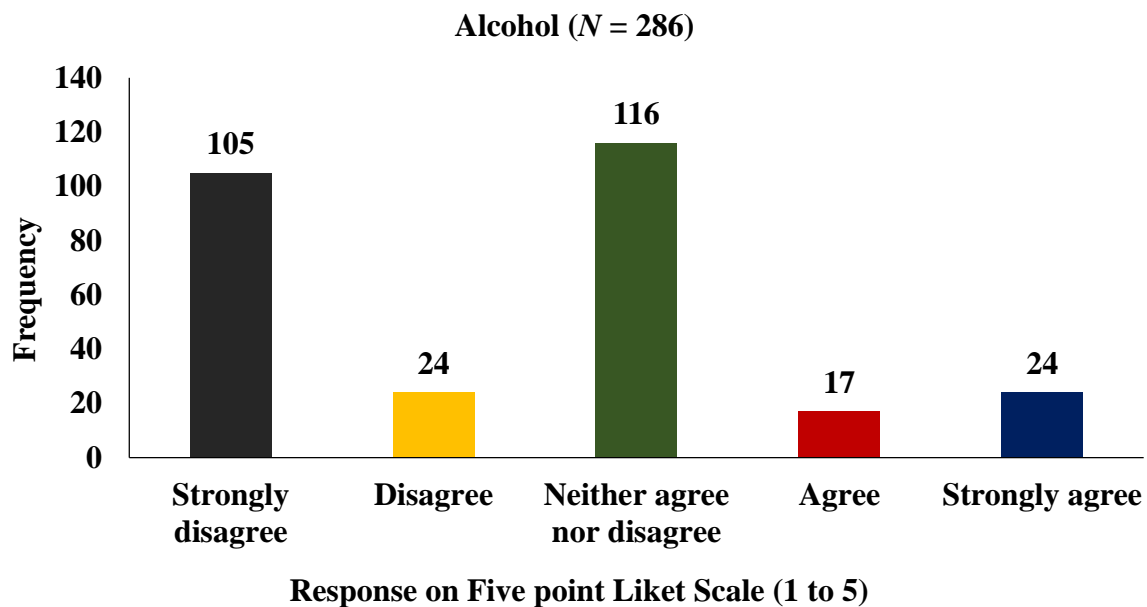


Figure 16. Bar graph presenting participants' responses to cause 'alcohol'

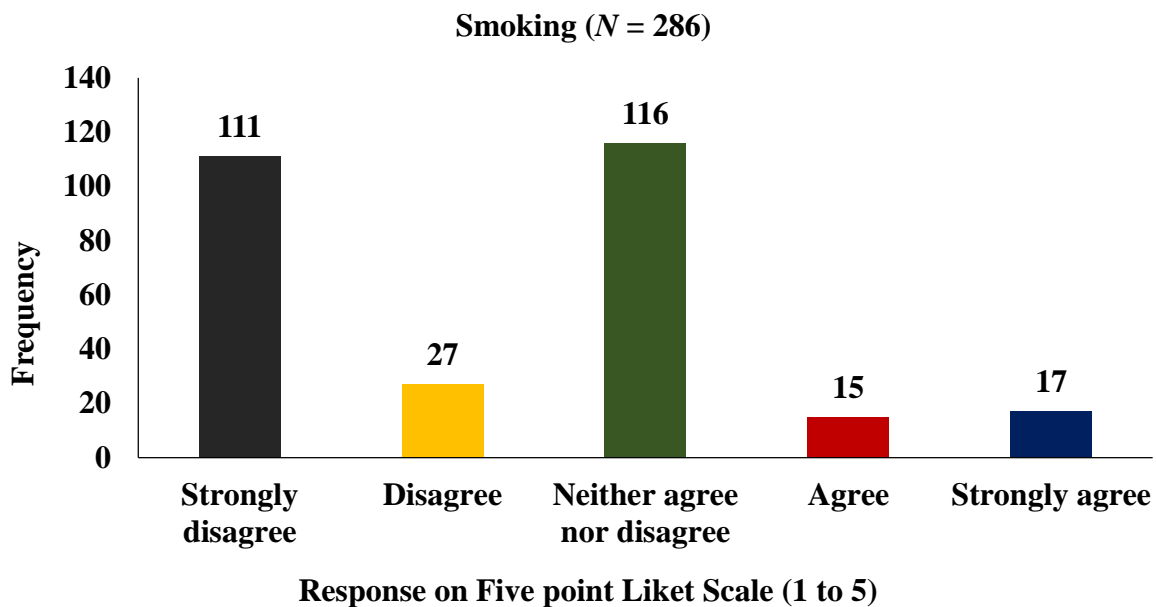


Figure 17. Bar graph presenting participants' responses to cause 'smoking'

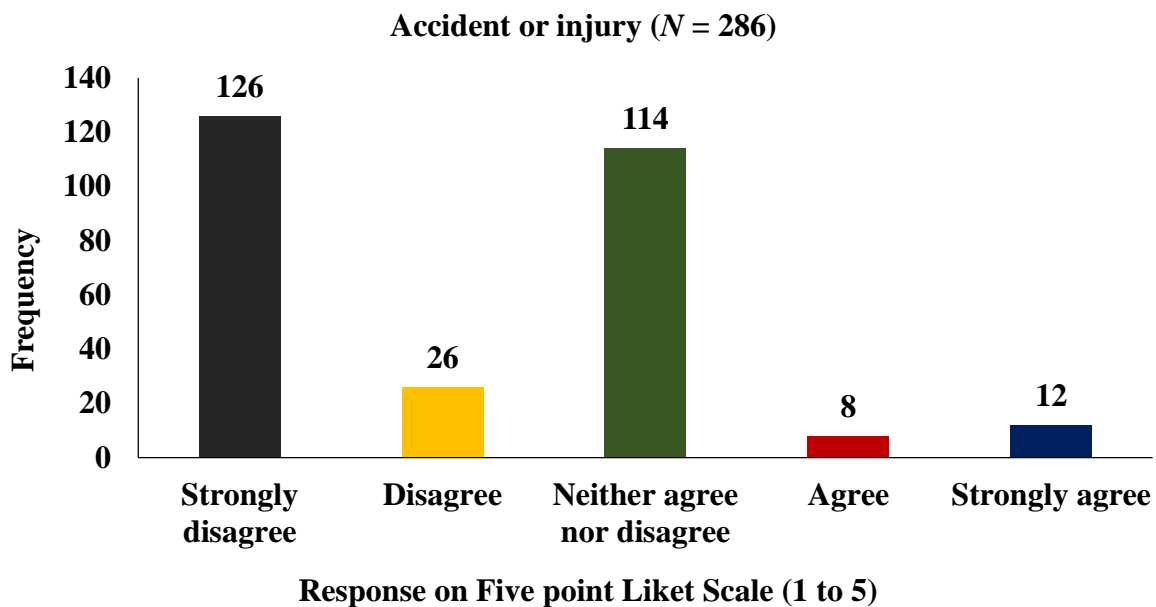


Figure 18. Bar graph presenting participants' responses to cause 'accident or injury'

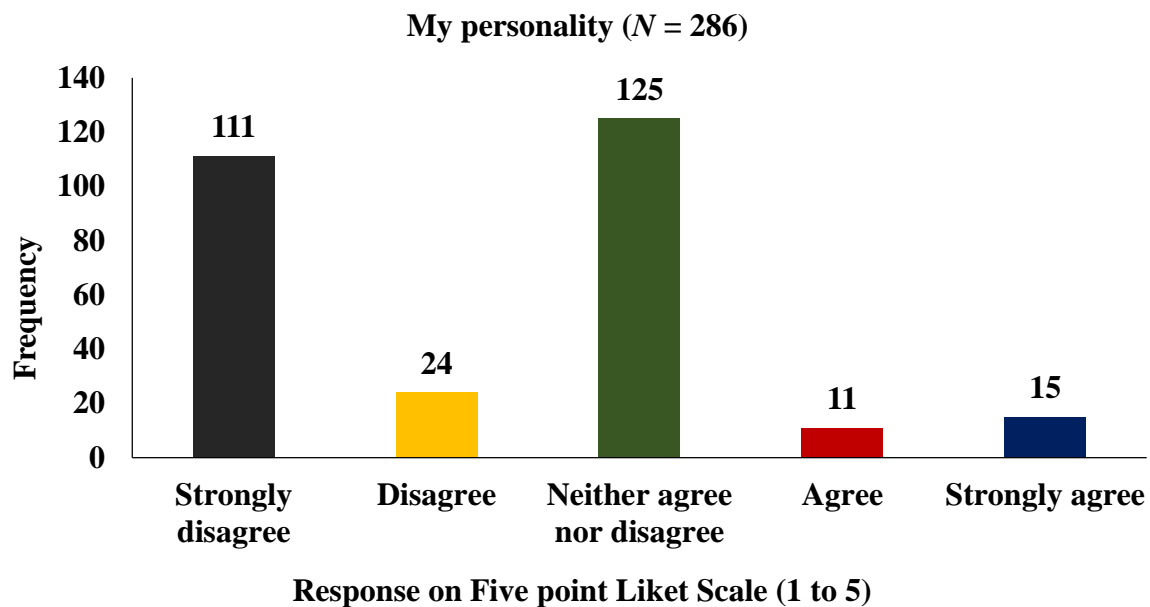


Figure 19. Bar graph presenting participants' responses to cause 'my personality'

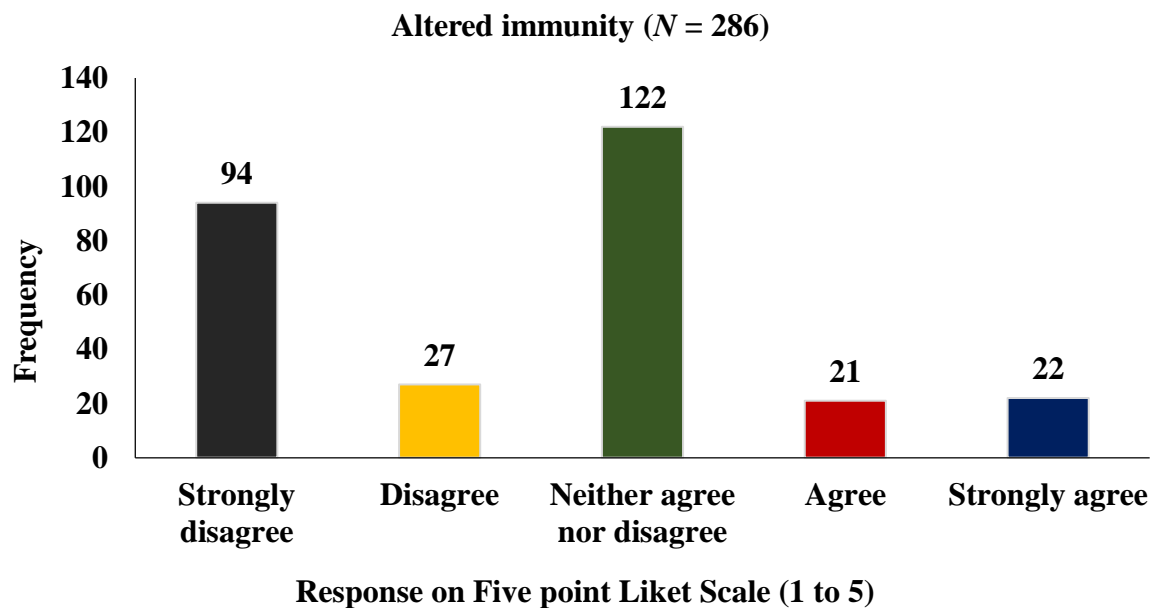


Figure 20. Bar graph presenting participants' responses to cause 'altered immunity'

Figure 3 to 20 represents participants' disagreement or agreement towards 18 causes. The graph depicts responses on five point Likert scale ranging from "*strongly disagree*" to "*strongly agree*". From the graph it is evident that hereditary was most agreed cause followed by stress or worry and least agreed cause was germ or virus.

Factors Reported by Participants (in rank order) Responsible for their Diabetes

Apart from 18 the causes, in the third section of revised illness perception questionnaire, participants were requested to provide three factors in rank order that they believed were causes of their diabetes. This part was helpful in knowing the misconceptions participants held and additional causes that were not presented as part of 18 causes. Out of 286 participants, only 105 participants reported all the three factors, whereas 54 reported two factors, 88 reported one factor and 39 did not respond. These factors were further divided into the following categories: psychological attributions, risk factors, hereditary, other causes, and misconceptions. Figure 21 represents the frequency of response participants gave for the causes.

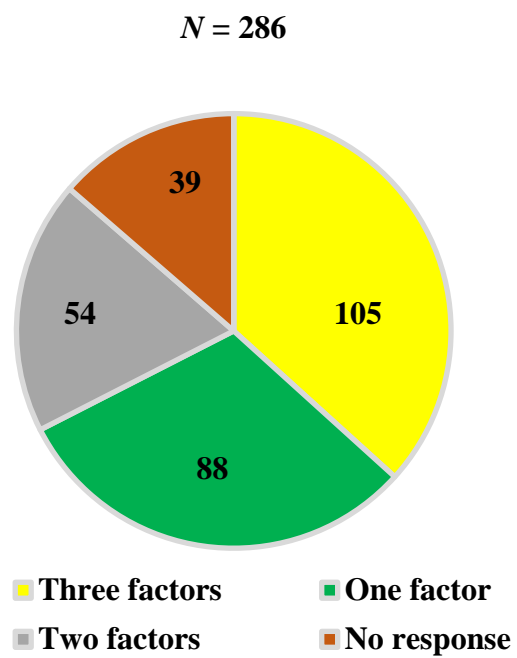


Figure 21. Pie chart presenting frequency of participants' reporting one, two, three factors and no response

All the reported causes were categorized under psychological factors, hereditary, risk factors, other factors, and misconceptions. Under the category of first rank— 104 participants made psychological attributions, 94 reported hereditary, 33 reported risk factors, 8 reported other causes whereas 39 did not report any factors and 8 participants reported misconceptions regarding causes. Under the category of second rank— 55 participants made psychological attributions, 33 reported hereditary, 65 reported risk factors, 4 reported other causes whereas 127 did not report any factors and 2 participants reported misconceptions regarding causes. Under the category of third rank— 44 participants made psychological attributions, 8 reported hereditary, 44 reported risk factors, 8 reported other causes whereas 181 did not report any factors and only one participant reported misconception regarding causes.

The psychological factors included stress or worry, overwork, family problems or worries, personality, emotional state and mental attitude. The risk factors included consumption of alcohol, poor medical care in past, lifestyle changes/sedentary/unhealthy lifestyle, own behaviour, ageing, medicines, being overweight, smoking, lack of physical activity, lack of hemoglobin, pregnancy, age, poor medical care in past, and diet or eating habits and few health conditions such as stroke, lump, thyroid problems, post-surgery, fever, and high blood pressure. Other causes included external forces such as God, karma, being unlucky, altered immunity, pollution in the environment, and accident or injury. Finally misconceptions included that it is common to get, consumptions of bananas in childhood, consumption of mangoes, excessive sweets, excessive food intake, consumption of junk food, body type,

and everyone gets so I have it. These factors are presented in table 12 and graphically represented in figure 21.

Table 12

Three Factors responsible for Diabetes

Causes/Rank	1st rank	2nd rank	3rd rank
Psychological attributions	104	55	44
Hereditary	94	33	8
Risk factors	33	65	44
Other causes	8	4	8
Misconceptions	8	2	1
Don't know/not reported	39	127	181
Total (N = 286)	286	286	286

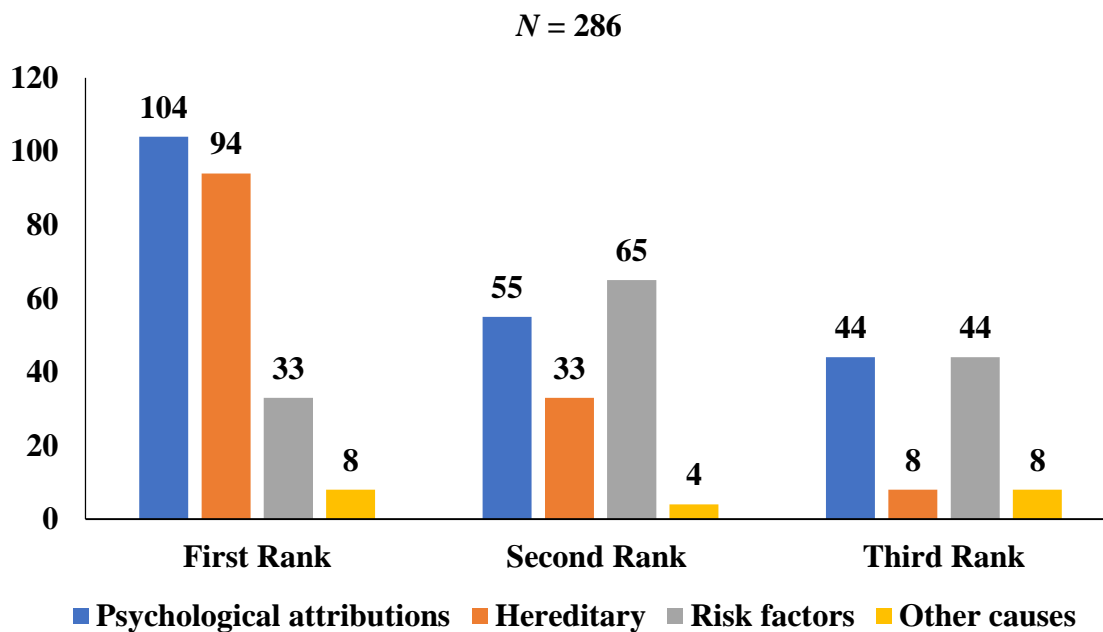


Figure 22. Bar graph presenting frequency of each category of cause under rank one, two, and three

The frequency of various causes under category of first, second and third rank are described in figure 22. Misconceptions and don't know response is not presented in graph.

Lived Experiences of Type 2 Diabetes Patients (Phase II)

The objective of the study was to explore the lived experiences of Type 2 diabetes patients to understand the factors influencing (facilitating factors and barriers) their diabetes self-management. This objective was addressed by utilizing a qualitative research framework. In phase II, interpretative phenomenological analysis was followed and thematic analysis was adopted to analyse the qualitative data (interviews). The participants explained their experiences with diabetes and its management and provided the investigator with qualitative data.

Participants' Characteristics

The participants' characteristics (table 13) are described below. Pseudonyms were used to ensure participants' anonymity.

The high diabetes self-management group included five (four women and one men) participants. The age of the participants ranged from 50 to 73 years. And the duration of diabetes varied from 2 years to 27 years. All the participants were married. The following comorbid conditions were reported high blood pressure, thyroid conditions, and eye sight. The educational qualification of the participants was from primary education to post graduation— one participant from primary school, one from secondary school, two from higher secondary school and one from post-graduation

course. All the participants were on oral medications whereas one was under insulin intake. The primary care providers were son, spouse, and daughter.

The low diabetes self-management group included five (women) participants. The age of the participants ranged from 30 to 58 years. And the duration of diabetes varied from 2 years to 8 years. Four participants were married and one was a widow. This group did not report any comorbid conditions. The education qualification of the participants was from primary school to post graduation— one participant from primary school, one from middle school, one from post-graduation course and two did not receive primary school education. All the participants were on oral medications whereas one was under insulin intake. The primary care providers were spouse, family, and children.

Table 13

Demographic Characteristics of Participants' (N = 10; high diabetes self-management (5) & low diabetes self-management (5))

S. no	Participants Pseudonyms	Gender	Age	Education	Marital Status	Duration of diabetes	Comorbid conditions	Primary care provider	Insulin intake
High Diabetes Self-Management (HDSM)									
1	Srishti	Female	69 years	Primary school	Married	6 years	High blood pressure & Thyroid condition	Self, son	No
2	John	Male	68 years	Post-graduation	Married	2 years	None	Self, Spouse	No
3	Miriam	Female	73 years	Higher secondary school and nursing	Married	8 years	High blood pressure	Self, Daughter	No
4	Uma	Female	54 years	Secondary school	Married	27 years	None	Husband	Yes
5	Kumari	Female	50 years	Higher secondary school	Married	10 years	High blood pressure, eye sight	Self, Children	No
Low Diabetes Self-Management (LDSM)									
6	Gurupreet	Female	53	Post-graduation	Married	8 years	Arthritis	Self	No
7	Megha	Female	30	Middle school	Married	3 years	None	Spouse	Yes
8	Seekriti	Female	33	No primary education	Married	2 years	None	Family	No
9	Sujata	Female	45	Primary school	Married	3 years	None	Family	No
10	Honesty	Female	58	No primary education	Widow	4 years	None	Children	No

Themes and Sub-Themes

Data analysis took place in several steps which are discussed below. Interviews were audio-recorded and non-verbal behaviours were also recorded by the researcher. Field notes were prepared subsequently. Initially the verbatim of audio-recorded interviews were transcribed and translated into English. Then these transcripts were read and re-read along with field notes and observation reports to obtain clarity on participants' lived experiences of factors that facilitate or inhibit their diabetes self-management. After multiple reading, codes were identified. Then similar codes were clustered together and sub-themes were identified. The similar sub-themes were grouped together and were given names. Following which, similar sub-themes were put together to form a theme. The themes that emerged as facilitating factors and barriers to diabetes self-management are presented in table 14. The final themes were again compared to the transcripts to make sure that all the relevant aspects of data were included or not. Inputs were obtained from an experienced qualitative researcher during the process of analysis.

During the course of data analysis several themes emerged. However, only those themes relevant to the research questions (facilitating factors and barriers to diabetes self-management) were taken into account. The themes and sub-themes are listed in Table 14. The themes and sub-themes with illustrative quotations are presented in Table 15.

Table 14

Themes and their Sub-themes

	Themes	Sub-Themes
Facilitating Factors	Belief system	Belief in God Belief in Self
	Support from family members	
	Persistent care	
	Knowledge about diabetes	
	Wish for a healthier future	
Barriers	Social constraints	Lack of financial resources Social obligations
	Lack of informational support from Physician	
	Poor health value	
	Presence of comorbid conditions	

Table 15

Themes and their Sub-themes with illustrative quotation

Facilitating factors		
Themes	Sub-themes	Illustrative quotation
Belief System	Belief in God	“...God is the ultimate help I have. I always believe....”
	Belief in Self	“....I can control my illness...I clean my gangrene. I do all the necessary things to keep my condition in control”.
Support from family members		“My spouse and daughter help me in managing diabetes. My daughter is a nurse so she helps me manage my diabetes. My husband reads about diabetes and informs me.” “My daughter is a doctor. She informs me about diabetes-related facts.”
Persistent care		“Continuous care is required for maintaining normal blood sugar levels. I take medicines every day, control diet and go for blood testing regularly. These days my sugar levels are very normal, I don’t take insulin anymore which I used to when my sugar level was high and I also lost some weight.”
Knowledge about diabetes		“.....And I keep reading news articles about diabetes, types of food to be taken etc.”
Wish for a healthier future		“I want to be healthy in future, so I take care of myself... I don’t want to give any trouble to [my] children or other family members because of my condition....”
Barriers		
Social constraints	Lack of financial resources	“We don’t have enough money to spend on medicines, blood tests, doctor fees, and travel from our village to doctor’s clinic.”
	Social obligations	“...Sometimes when I am attending family functions I eat what I am not supposed to eat. I don’t control my diet.”

Lack of informational support from the physician	“Due to lack of information regarding diabetes I feel tensed, I expect some more information from the doctor about my diabetes.”
Poor health value	“I don’t care about my diabetes. I eat whatever I want and don’t exercise. I remain tension free. Whatever has to happen will happen...But I take medicines”
Presence of comorbid conditions	“I have joint pains so I can’t do exercise. I just walk inside [my] house”

Facilitating factors to Diabetes Self-Management

The analysis of interview data identified the following factors that participants perceive as helpful in self-managing their diabetes: belief system, support from family members, persistent care, knowledge about diabetes and wish for a healthier future.

Belief System

Participants' belief system was found to play a significant role in effective diabetes self-management. Two sub-themes under this theme included belief in God and belief in Self.

(1) Belief in God

Belief in God was reported by few participants as a vital source of help in managing their diabetes. Few participants believed in prayers for better health and reported God as 'healing' source in times of illness. One participant reported the following:

"...God is the ultimate help I have. I always believe...."

(2) Belief in Self

Most of the participants believed in 'self' to manage their illness. They demonstrated confidence in their ability to personally control their illness. In other words, participants were more internally oriented towards their health and managing illness. One of the participants reported:

".....I can control my illness...I clean my gangrene. I do all the necessary things to keep my condition in control".

Support from Family Members

All the participants unanimously reported that support from family as one of the major sources in managing their diabetes effectively. Emotional and tangible support from spouse and children who happened to be medical professionals were the sources of encouragement to the participants. Some of the participants perceived family members with professional medical training as the sources of informational support in managing their diabetes. They indicated that they received information about their illness and its management from their family members. Two participants reported:

“My spouse and daughter help me in managing diabetes. My daughter is a nurse so she helps me manage my diabetes. My husband reads about diabetes and informs me.”

“My daughter is a doctor. She informs me about diabetes-related facts.”

Persistent Care

All the participants considered adherence to prescribed medication/insulin, dietary and exercise guidelines and regular blood glucose testing as important factors to achieve normal blood glucose levels and to avoid complication of diabetes. A participant emphasized that persistent, continuous and everyday care is required in maintaining normal blood sugar levels and also reported how this persistence has resulted in positive outcomes. The participant reported:

“Continuous care is required for maintaining normal blood sugar levels. I take medicines every day, control diet and go for blood testing regularly. These days my

sugar levels are very normal, I don't take insulin anymore which I used to when my sugar level was high and I also lost some weight."

Knowledge about Diabetes

Participants expressed the significance of knowledge in managing the chronic illness. One of the frequent responses by most participants was the information regarding diabetes and its management. Participants were satisfied with the information provided by their family members. However, some of them felt that attaining information personally gave them a sense of satisfaction and active involvement in managing their diabetes. It implies that they were proactive in health information seeking behaviour. One participant reported:

".....And I keep reading news articles about diabetes, types of food to be taken etc."

Wish for a Healthier Future

Few participants discussed that the desire to have a good health in the future was a motivating force to manage their condition effectively. They believed that in order to stay healthy in the future, they would adopt health-promoting behaviours, a prerequisite for diabetes self-management. In this way they were also making efforts to avoid long-term diabetes complications. One of the participants was concerned about the family members and told that the close ones would be in trouble due to the illness. The participant reported the previous experience of hospitalizations and described that the incident was difficult for her closed ones. Hence, the participant was performing all the required diabetes self-management behaviours and reported:

“I want to be healthy in future, so I take care of myself... I don't want to give any trouble to [my] children or other family members because of my condition....”

Barriers to Diabetes Self-Management

Participants discussed the difficulties they encountered in the process of managing their diabetes. Some of the barriers reported by participants included social constraints, lack of informational support from the physician, poor health value and presence of comorbid conditions.

Social Constraints

This theme explored the social constraints that hindered participants' diabetes self-management. The two sub-themes under this theme included lack of financial resources and social obligations.

(1) Lack of Financial Resources

One of the significant barriers identified by some of the participants hindering their diabetes self-management was lack of financial resources. Having diabetes frequently disrupt the family's financial structure and was considered as an additional cost to the family's budget. One participant reported:

“We don't have enough money to spend on medicines, blood tests, doctor fees, and travel from our village to doctor's clinic.”

(2) Social Obligations

Participants reported the social constraints encountered during certain occasions such as marriage or a social gathering. One participant mentioned that avoidance of

social gathering is not easy and following dietary recommendations is difficult in such situations as the participant felt obliged to consume the food. One aspect the participant also endorsed most strongly was her inability to resist high-calorie foods served in the social functions.

“...Sometimes when I am attending family functions I eat what I am not supposed to eat. I don't control my diet.”

Lack of Informational Support from the Physician

This theme explored the support received from the physician. Participants perceived that lack of informational support from the physician was one of the barriers in self-managing the condition successfully. One of the participants wanted the physician to provide more information about the condition and lack of information was stressful to the participant. This implies that in order to manage the illness, patients need more informational support from the physicians.

“Due to lack of information regarding diabetes I feel tensed, I expect some more information from the doctor about my diabetes.”

Poor Health Value

This theme illustrated participants' attitude towards managing their diabetes and health. One of the participants was not in favour of exercise and dietary recommendations. This shows that participants do not value certain aspects of their diabetes self-management regime and their health in general. However, they reported taking medications for diabetes.

“I don’t care about my diabetes. I eat whatever I want and don’t exercise. I remain tension free. Whatever has to happen will happen...But I take medicines”

Presence of Comorbid Conditions

This theme illustrated the non-adherence to treatment regimen among participants due to the presence of comorbid conditions. Inability to perform exercise due to joint pain was one explanation given by one participant.

“I have joint pains so I can’t do exercise. I just walk inside [my] house”

To conclude, a range of facilitating factors and barriers to diabetes self-management were identified in the present study. The process of diabetes self-management was largely facilitated by the presence of social support, knowledge about the illness, belief in God and Self, desire for a healthier future and persistent and continuous care. All the participants with high diabetes self-management scores valued their health and the support they received from their spouse and family members. The barriers leading to sub-optimal self-management of diabetes included poor value assigned to the illness management and health in general, lack of information regarding illness from the physicians, social constraints, and physical ailments.

Investigator’s Report

The experience of the investigator throughout the study was filled with enthusiasm and productive interaction with the participants. The response of the participants, medical and paramedical staff of the clinics where the study was conducted was positive. The employees of the clinic were accommodative and helpful throughout the data collection process. The participants were receptive after explaining the purpose

of the study, though initially, they were hesitant. They were interested to share their views about diabetes and various elements associated with their diabetes self-management. However, some of the participants declined to take part in the study due to reasons unknown to the investigator. Hesitation on part of the respondents (some) was noticed while answering certain questions. Some of the participants were very honest regarding their responses. During the interviews participants (some) were open about their struggle to achieve and specifically maintain normal blood sugar levels. They also highlighted the strengths and weakness that influence their management. It was observed that few participants had lack of understanding of the significance of psychological variables that play a role in their management. Some of the participants were stressed up with the illness and its management and felt anxious.

Analysis of interviews also highlighted various aspects such as the impact of illness on participants' lives. Some of the participants discussed how their condition had an impact on various aspects of their life. One of the participants reported that she experienced negative thoughts when her condition deteriorated and other reported about fear of uncertainty due to illness. Few of them were more concerned about close family members who constantly look after them for instance accompanying them to doctors' clinic, blood testing, and providing care in case their condition deteriorated. One of the participants reported feelings of tiredness as a result of continuing care over the years and do not like when constantly reminded of the adherence regimen by some family members. Given such experiences, some of them were able to self-regulate themselves cognitively and emotionally and utilized internal and external resources to achieve and maintain effective diabetes self-management. Some of them could not utilize their

internal resources and due to certain non-modifiable external resources, poor diabetes self-management resulted.

At a personal level, the investigator enjoyed interacting with the participants, getting an insight into how different participants manage their condition adopting different coping strategies. This study was a value addition to the investigator's skills in interviewing participants and administering psychological scales.

CHAPTER V

DISCUSSION

The present study was conducted using a mixed method sequential explanatory design, with the following objectives: (1) to find out the level of illness perceptions, health hardiness, and diabetes self-management among Type 2 diabetes patients (2) to examine the relationship between demographics (gender, age, duration of diabetes and comorbid conditions), illness perceptions, health hardiness and diabetes self-management among Type 2 diabetes patients (3) to examine whether demographics (gender, age, duration of diabetes, and comorbid conditions), illness perceptions and health hardiness predict diabetes self-management among Type 2 diabetes patients and, (4) to explore the lived experiences of Type 2 diabetes patients for understanding the facilitating factors and barriers to diabetes self-management. The results have been discussed below in the light of past research and available theoretical frameworks.

The study included participants with the age range of 27 years to 83 years. Research studies have shown that in Asian countries the burden of diabetes is disproportionately high among young to middle aged individuals (Chan et al., 2009; Ramachandran, Wan Ma, & Snehalatha, 2010). In this study the mean duration of diabetes was higher for men indicating that men had longer duration of diabetes as compared to women. It was observed that 36 percent (at least one condition) of the sample reported comorbid illnesses which included hypertension, thyroid conditions, cardiovascular diseases, respiratory diseases, cancer, and paralysis. Research shows that the common comorbid illnesses seen in diabetic patients are hypertension and cardiovascular diseases (Iglay et al., 2016). In the present study, relatively higher number

of women reported comorbid conditions. This finding is supported by a study where women had higher morbidity and mortality in relation to cardiovascular disease (Arnetz, Ekberg, & Alvarsson, 2014).

The identity subscale of IPQ-R consisted of 14 symptoms where participants were asked to report whether they had experienced those symptoms since the diagnosis of their diabetes. They were also asked whether those symptoms were related to their illness. The participants reported lower identity perception, implying that they attributed fewer symptoms to their diabetes, which they experienced since the diagnosis. One reason could be that, even if the participants had experienced those symptoms, they might have attributed them to other everyday acute conditions or considered them as general symptoms and not specific to their diabetes. However further exploration is needed as to know why the participants attributed fewer symptoms to their diabetes. The symptoms—loss of strength was the highest reported symptom followed by fatigue and pain whereas sore throat, nausea, breathlessness, and wheezing were the least reported symptoms by the participants related to their diabetes. Increased fatigue was a commonly reported symptom in a study done on individuals with both Type 1 as well as Type 2 diabetes. Shortness of breath and chest pain were also reported by diabetic patients and sleep apnea and other sleep problems were found to be related to Type 2 diabetes (Clark, Fox, & Grandy, 2007).

Based on the second objective, the hypothesis stated that *there would be a relationship between demographics (gender, age, duration of diabetes and comorbid conditions), illness perceptions, health hardiness, and diabetes self-management among*

Type 2 diabetes patients. This hypothesis was accepted as the findings showed significant relationships between the above mentioned variables.

The results showed both significant positive and negative relationships between illness perceptions and demographic variables. A positive relationship was observed between consequences and gender as well as emotional representations and gender. This indicates that women perceived diabetes with severe consequences and experienced high emotional worries (upset, anger, anxiety) as a result of their condition. Past research has demonstrated similar findings where women suffering from Type 2 diabetes had higher levels of distress (Ramkisson, Joseph Pillay, & Sartorius, 2016). The study by Mosnier-Pudar et al., (2009) indicated that half of the type 2 diabetic patients especially women perceived their illness as severe. Similarly, in another study individuals were found to report concerns regarding the consequences arising due to their diabetes and experienced emotional distress (Patel et al., 2015). The demands placed on the diabetic patients, due to strict adherence to a complex regimen including monitoring of blood sugar levels, preparing special meals, and medication intake, can sometimes be difficult and frustrating, which may lead to emotional distress.

Women and girls were shown to have negative ways of dealing with diabetes as compared to their counterparts. Anxiety and depression were found to be more common in females (La Greca, Swales, Klemp, Madigan, & Skyler, 1995; Lernmark, Persson, Fisher, & Rydelius, 1999; Dabadghao, Vidmar, & Cameron, 2001). Women tend to internalize stress more than men who tend to deal with stress by engaging in positive behaviour like practicing sports. Research shows that adolescent diabetic girls were found to engage in fewer physical activities as compared to boys, possibly leading to worse

diabetic control (Cruickshanks, Orchard, & Becker, 1985). However, gender was not observed to be associated with any other dimensions of illness perception.

A positive relationship was observed between timeline (acute/chronic) and age indicating that older people perceived diabetes as long term and chronic. These perceptions are in accordance with the medical perspective where Type 2 diabetes is described as chronic illness and individuals have to live with it lifelong. This shows that the participants were aware of the nature of their illness and its duration. On the other hand, a negative relationship between emotional representations and age was observed implying that an increase in chronological age is associated with fewer emotional worries due to diabetes and vice versa. One plausible explanation could be that the older participants might have adjusted well to their diabetes over the years and have developed various coping strategies in effectively managing their emotions associated with the condition. In other words, they might have learnt to self-regulate their cognitive and emotional aspects required in managing their diabetes. As a result, they might experience lesser negative emotions such as fear, anger, and anxiety due to diabetes. Similar findings are reported by a study where older age was related to lesser odds of diabetes distress (Nanayakkara et al., 2018).

A positive association was observed between duration of diabetes and three aspects of illness perception— timeline (acute/chronic), consequences and timeline cyclical. This shows that people with longer duration of diabetes perceived diabetes as a chronic condition, unstable or cyclical (timeline cyclical), and associated with severe consequences. One plausible reason for this finding could be that individuals with longer duration, over the course of living with diabetes, might have learnt the fact that their

condition is chronic through various sources and personal experience. And they might have experienced the impact of diabetes (consequences) in different dimensions of life over the period of time and might have developed perceptions that their condition is unstable. These might be the reasons for the positive association between longer duration, and timeline (acute/chronic), timeline cyclical and consequences dimensions. However further research is needed to establish these explanations. These perceptions are in accordance with the medical perspective where Type 2 diabetes is described as chronic illness related to serious consequences which are preventable utilizing various preventive measures (Stratton et al., 2000; American Diabetes Association, 2009). These findings are supported by a previous study which revealed a positive association between length of diabetes diagnosis and timeline chronic beliefs and consequences among diabetic individuals (Paddison, Alpass, & Stephens, 2010). In this study a positive relationship between timeline (acute/chronic) and comorbid conditions was observed indicating that the presence of comorbid conditions (one or more) is associated with perceiving diabetes as chronic condition.

In relation to health hardiness components, gender showed positive association with external health locus of control showing that women were more externally oriented towards their health. In other words, women attributed their healthy state to luck and believed that things affecting their health are outcome of chance. This is in accordance with the results of the previous studies on type 2 diabetic patients which found that women scored high on external-chance aspect as compared to men indicating that women attributed the control of their condition to chance which might negatively affect their diabetes control (Fuscaldi, Balsanelli, & Grossi, 2011). Research suggests that women

tend to be more external as compared to their counterparts on most locus of control measures (Sherman, Higgs, & Williams, 1997).

On the contrary gender was observed to have a negative association with internal health locus of control indicating that men depicted higher scores on internal health locus of control. This indicates that men believed that they were in control of their health and were directly responsible for their health. One possible explanation could be the freedom and independence that men receive from their families from an early age, which gives them an opportunity to exercise control and hence they are inclined towards internality. As a result, the belief in ones' ability to control events or circumstances will be seen in different dimensions of their life including health. On the contrary in Indian context girls are raised to be dependent, conservative and are not exposed to behaviours that require exercising control. As a result of which they may be inclined towards externality.

These results are in accordance with the predominant trend observed in the literature i.e. men tend to score high on internal locus of control in comparison to their counterparts. In a study on diabetic patients to examine the relationship between adherence to diabetes regime and locus of control, it was observed that men significantly outscored their counterparts on internal locus of control and women significantly outscored men on external locus of control (Morowatisharifabad, Mahmoodabad, Baghianimoghadam, & Tonekaboni, 2009). The reasons for tendency towards internality or externality have not been explored in this study as it was not the purpose of the study however research have showed that specific factors underlie the tendency towards internality or externality.

No significant relationship was found between age and the components of health hardiness. Duration of diabetes was found to have a positive association with health value indicating that as the duration increased health value also increased. In other words, longer duration of diabetes was found to be associated with handling oneself well with respect to health, willing to make daily sacrifices for a better health, depicting determination to be healthy and not giving up easily on efforts towards improved health. One reasonable explanation for this could be that the progression of illness leads to a number of health complications. To avoid these complications patients are committed to health activities and keep themselves engaged in health promoting behaviours. In other words, they place higher value on health and its promotion.

Finally, comorbid conditions were found to have a positive relationship with health value and perceived health competence indicating that presence of comorbid illness is associated with higher scores on health value and perceived health competence. Presence of at least one comorbid condition or more is associated with higher value placed on health and ability to accomplish goals undertaken to improve the health. In the context of chronic condition such as diabetes, the need for valuing health is essential to achieve optimal diabetic control and better health in the long run. Valuing health becomes even more important in the context of comorbid conditions as patients need to place extra efforts in managing their comorbid conditions apart from managing their diabetes. And this requires substantial degree of perceived health competence which might be instrumental in implementing coping strategies and making behavioural changes require to manage the illness.

Predictors of Overall Diabetes Self-Management

Out of four demographic variables, three were found to have positive relationship with overall diabetes self-management and they are age, duration of diabetes, and comorbid conditions. This implies that older age, longer duration of diabetes and presence of comorbid conditions are related to better overall diabetes self-management. Concerning positive association between age and overall diabetes self-management one plausible explanation could be that the older participants might have more time to manage their illness and might be relatively free from the responsibilities of life. And they might have well-adjusted to the illness and developed effective coping strategies over the years which makes it easier to manage their illness without any obstacles. This finding is in accordance with a previous study on diabetes patients where participants with older age and comorbid conditions were more likely to obtain better outcomes of care (Saifullah, 2016). Another study showed that elderly patients or individuals with higher educational level exhibited better self-management behaviour (Huang, Zhao, Li, & Jiang, 2014).

With longer duration of diabetes, patients tend to become better at executing overall diabetes self-management or behaviours such as food choices adopted to attain optimal blood glucose levels, keeping doctor's appointments, checking blood sugar levels regularly with care and attention, intake of medication/insulin as prescribed and regular physical activity. The probable reasons could be that as the duration of diabetes progresses the individuals learn to adjust and integrate their diabetes management regime into their routine. Also, over the course of time they develop effective coping strategies and identify support sources which assist them in managing their condition.

Concerning illness perceptions, overall diabetes self-management was positively related to timeline (acute/chronic), personal and treatment control, and illness coherence. This implies that perceiving diabetes as chronic condition, perceptions of control or confidence in influencing diabetes, perceptions of treatment control as well as greater understanding (illness coherence) of diabetes are associated with improved overall diabetes self-management. This outcome is in accordance with a research study done on individuals with Type 1 and Type 2 diabetes where it was revealed that illness representations explained significant proportion of variation in adherence to overall self-management and greater perception of illness coherence was related to higher adherence to overall self-management (Abubakari et al., 2016).

Regarding health hardiness, a positive relationship was observed between overall diabetes self-management and health value, internal health locus of control and perceived health competence. This shows that higher health value, internal orientation towards health and perceived health competence are associated with improved overall diabetes self-management. This finding is supported by a study done on diabetic patients where a direct and significant relationship was observed between internal health locus of control and self-care behaviours (Abredari et al., 2015). On the contrary a negative relationship was observed between overall diabetes self-management and external health locus of control indicating that external orientation towards health is associated with poor overall diabetes self-management and vice versa. This finding is supported by the study done by Abredari and colleagues (2015) where an inverse relationship was observed between chance health locus of control and self-care behaviours among diabetic patients.

To find out the role of demographic variables, illness perceptions and health hardiness in predicting overall diabetes self-management, a hierarchical multiple regression was carried out comprising of three models. All the three models were found to be significant in predicting overall diabetes self-management. In first model, duration of diabetes and comorbid conditions emerged as significant individual contributors of overall diabetes self-management, in second model only personal control and illness coherence predicted overall diabetes self-management and in the third final adjusted model only health value and internal health locus of control emerged as significant predictors of overall diabetes self-management. A study done by Wallston et al. (2007) indicates that the degree to which individuals with Type 2 diabetes are able to self-manage their condition is related to the beliefs they hold, their values and confidence in themselves in performing the health behaviours.

Predictors of Glucose Management

It was noted from the study that various demographic and disease characteristics were observed to be significantly associated with participants' diabetes self-management behaviours. Similarly, illness perceptions and health hardiness aspects contributed significantly in predicting participants' diabetes self-management and its components.

A positive relationship was seen between glucose management and two of the demographic variables— duration of diabetes and comorbid conditions. This implies that longer duration of diabetes and presence of comorbid conditions are related to improved glucose management. In other words, longer duration and presence of comorbid conditions are associated with behaviours specific to glucose management i.e. checking blood sugar levels regularly and frequently and adherence to medications/insulin as

prescribed. Monitoring blood glucose levels and medication adherence are crucial elements of diabetes self-management to achieve strict diabetic control. Regular monitoring will help the patients in adherence to necessary dosage of insulin intake. The findings are supported by previous research where an association was observed between higher comorbid conditions and adherence to medication in diabetes patients (Huber & Reich, 2016).

A positive relationship was noticed between glucose management and different illness perceptions namely timeline (acute/chronic), personal control, treatment control and illness coherence. This shows that individual's perception of diabetes as a chronic condition, perceptions of personal and treatment control as well as coherent understanding (illness coherence) is associated with glucose management. Concerning health hardiness, a positive relationship was observed between glucose management and three components of health hardiness namely health value, internal health locus of control and perceived health competence. This indicates that higher health value, internal orientation towards health, and higher perceived health competence lead to improved levels of glucose management. On the contrary a negative relationship was observed between glucose management and external health locus of control showing that external orientation towards health is associated with poor glucose management and vice versa.

After establishing the relationship between the variables, hierarchical multiple regression was conducted to identify the predictors of glucose management. Hierarchical multiple regression was also computed to identify the predictors of other components of diabetes self-management. Three models were developed with respect to glucose management where demographics were entered first, illness perceptions second and

health hardiness components third. This sequence was followed for all the components of diabetes self-management as well as overall diabetes self-management.

In relation to glucose management, all the three models were found to be significant in predicting glucose management. In first model comorbid conditions significantly predicted glucose management, in second model perceptions of timeline (acute/chronic) and personal control significantly predicted glucose management and in the final adjusted model timeline (acute/chronic), and two components of health hardiness— health value and internal health locus of control significantly predicted glucose management. Final model indicates that perceiving diabetes as chronic conditions, higher value for health and internal orientation towards health play a significant role in glucose management.

Predictors of Dietary Control

Similar to glucose management dietary control subscale of diabetes self-management was also observed to have a significant positive relationship with duration of diabetes and comorbid conditions. This indicates that longer duration of diabetes and presence of comorbid conditions were associated with improved behaviours specific to dietary control i.e. choosing food that makes it easier to obtain optimal blood sugar levels, avoiding sweets or food high in carbohydrates, avoiding binge eating, and following all the necessary dietary recommendations.

In relation to illness perceptions, dietary control showed a positive relationship with personal and treatment control and illness coherence. This indicates that a sense of personal control over diabetes, higher perceptions of treatment control, and illness

coherence are associated with higher levels of dietary control. This finding is supported by research study conducted on diabetic patients where dietary adherence was related to higher personal and treatment control (Broadbent et al., 2011).

In relation to health hardiness, similar trend was noticed as with glucose management. A positive relationship was observed between dietary control and three components of health hardiness namely health value, internal health locus of control and perceived health competence. This indicates that placing higher value on health, internal orientation towards health and perceived health competence are associated with improved dietary control. On the contrary a negative relationship was observed between dietary control and external health locus of control indicating that external orientation towards health is associated with poor dietary control and vice versa.

To find out the role of demographic variables, illness perceptions and health hardiness in predicting dietary control, a hierarchical regression was carried out comprising of three models. All the three models were found to be significant in predicting dietary control. In first model duration of diabetes significantly predicted dietary control, in second model duration of diabetes, perceptions of personal control and illness coherence significantly predicted dietary control and in the third final adjusted model only health value and perceived health competence emerged as significant predictors of dietary control. Final model indicated that only health hardiness components significantly predicted dietary control.

Predictors of Physical Activity

From the analysis of the results it was found that, out of four demographic variables only gender showed a relationship with physical activity which was inverse indicating that men scored high on physical activity subscale of diabetes self-management.

In relation to illness perceptions, physical activity was found to be correlated with highest number of illness perceptions as compared to any other components of diabetes self-management. It was found to have a positive relationship with personal and treatment control and illness coherence indicating that higher perceptions of personal and treatment control, and a greater understanding (illness coherence) of diabetes is associated with improved physical activity i.e. undertaking regular physical activity to obtain diabetes control. This finding is supported by a study conducted by Broadbent and colleagues (2011) on diabetic patients. It was found from their study that exercise adherence was related to higher perceptions of personal control and illness coherence. On the contrary, perceptions of lack of control over illness have been linked to failure in planning and executing exercise routine among patients (Greenhalgh, Helman, & Chowdhury, 1998). Physical activity showed a negative relationship with consequences, timeline cyclical, and emotional representations indicating that perceiving diabetes with severe consequences and higher perceptions of timeline cyclical and emotional worries as a result of diabetes were found to be associated with poor levels of physical activity and vice versa.

In relation to health hardiness, a positive relationship was observed between physical activity and health value, internal health locus of control and perceived health

competence. This shows that higher health value, internal orientation towards health and perceived health competence are associated with improved physical activity levels. On the contrary a negative relationship was observed between physical activity and external health locus of control indicating that external orientation towards health is associated with lower levels of physical activity and vice versa.

To find out the role of demographic variables, illness perceptions and health hardiness in physical activity, hierarchical regression analysis was carried out comprising of three models. All the three models were found to be significant in predicting physical activity. In first model gender significantly predicted physical activity, in second model gender, personal control and emotional representations significantly predicted physical activity and in the third final adjusted model only gender and health value emerged as individual significant predictors of physical activity. Gender emerged as significant predictor of physical activity in all the three models.

Predictors of Health-Care Use

Only age and duration of diabetes were found to have a positive relationship with the health-care use component of diabetes self-management implying that older age and longer duration are associated with improved health-care use i.e. adherence to doctors' appointments.

Illness perceptions' personal and treatment control and illness coherence had positive relationship with health-care use. This indicates that confidence in controlling the diabetes, perceiving treatment as effective in controlling diabetes and a clearer understanding (illness coherence) of diabetes is associated with improved health-care use.

In relation to health hardiness, a positive relationship was observed between health-care use and health value, internal health locus of control and perceived health competence. This shows that higher health value, internal orientation towards health and perceived health competence are associated with improved health-care use. On the contrary a negative relationship was observed between health-care use and external health locus of control indicating that external orientation towards health is associated with poor health-care use and vice versa.

To find out the role of demographic variables, illness perceptions and health hardiness in health-care use, a hierarchical regression was carried out comprising of three models. All the three models were found to be significant in predicting health-care use. In first model there were no significant individual predictors of health-care use, in second model only personal control significantly predicted health-care use and in the third final adjusted model only age, health value and internal health locus of control emerged as significant predictors of health-care use.

To conclude it can be observed that personal and treatment control and illness coherence were found to have positive relationship with overall diabetes self-management and all of its components namely— glucose management, dietary control, physical activity, health-care use and overall rating of self-care. This indicates that a sense of confidence to control the illness, belief in effectiveness of treatment and greater understanding regarding diabetes is associated with improved overall diabetes self-management and its components. A study by Patel et al (2015) found that diabetic individuals with stronger beliefs regarding treatment control were more likely to engage in self-care.

And concerning health hardiness components— health value, internal health locus of control and perceived health competence showed positive relationship with overall diabetes self-management and all of its components. This finding is supported by previous research studies. Health hardiness was shown to be positively related to various health enhancing behaviours like exercising and dieting (Wiebe & McCallum, 1986; Pollock, 1989; Nagy & Nix, 1989). Specifically, perceived personal control and commitment towards health had been consistently shown to predict health behaviour (Funk, 1992). Locus of control is relatively stable and enduring aspect. Individuals with internality consider that events (good or bad) occurring in their lives are caused by controllable factors such as personal efforts, preparation, and attitudes. They feel responsible for their own actions and attribute both success as well as failure to personal efforts. And they tend to display confidence in their ability to perform tasks. In the present study individuals with internality, also demonstrated health value and perceived health competence which are essential components required for effective management of illness. Perceived health competence is the concept when individuals perceive themselves to be capable of effectively influencing their health outcomes. Health value is the extent to which one values his or her health and these two concepts were found to influence health behaviours in positive manner. Positive association between these three components of health hardiness and an improved overall diabetes self-management and its elements seems a logical outcome and has been supported by numerous studies.

On the other hand, a negative association was observed between overall diabetes self-management and all of its components and external health locus of control. This implies that those individuals who attributed their health to accident or luck were found

to score low on overall diabetes self-management and its component i.e. glucose management, dietary control, physical activity, and health-care use. Individuals with external locus of control perceive themselves powerless and tend to believe that other people or external forces (i.e. God etc.) exert influence on their lives. They perceive that the events or actions are due to uncontrollable forces. The plausible explanation for negative relationship between externality and diabetes self-management could be that the individuals do not consider themselves responsible for their disease management and attribute health to luck and accident. Such individuals tend to place the '*control*' onto external forces and perceive that they cannot control their lives as well as health. The first and second hypothesis of the study have been accepted.

Causes of Diabetes

Causal beliefs are of special significance as they influence coping strategies and decisions made towards adopting health behaviours. The third section of revised illness perception questionnaire presents 18 causes to the participants on a five point Likert scale. Participants were requested to indicate their agreement towards these causes. The 18 causes are: "stress or worry, hereditary-it runs in my family, a germ or virus, diet or eating habits, chance or bad luck, poor medical care in my past, pollution in the environment, my own behavior, my mental attitude, family problems or worries, overwork, my emotional state, ageing, alcohol, smoking, accident or injury, my personality and altered immunity". Out of these causes hereditary and stress were highest agreed causes of diabetes by the participants. Least strongly agreed cause was germ or virus. Participants 'perceived their diabetes as multifactorial condition. This finding is in line with previous research where individuals reported genetics, stress and diet as causes

of their diabetes (Patel et al., 2015). Similar finding was reported by another study done on individuals with Type 2 diabetes in Indian context (Chelli et al., 2017). In this study it was observed that diet or eating patterns and family problems or worries were the highest agreed cause after hereditary and stress.

In addition to the above causes participants were requested to report three factors responsible for their diabetes in rank order. This helped in obtaining any additional factors that were not part of 18 and it was also helpful in assessing participants' misconceptions related to causes. A total of 88 participants reported only one factor, 54 reported two and 105 reported all the three factors whereas 39 did not report any factor. Most participants (104) reported psychological causes under first rank category followed by hereditary (94), risk factors (33), other causes (8) whereas 39 reported the response 'don't know'. Under second rank category the highest reported causes were risk factors (65) followed by psychological factors (55) whereas under third rank category equal number of participants reported psychological (44) as well as risk factors (44). The psychological factors included stress or worry, overwork, family problems or worries, personality, emotional state and mental attitude. The risk factors included lifestyle factors and health conditions. This finding is encouraging as most of the participants were aware of the causes of their illness. These identified factors may be managed and controlled through psychosocial interventions, though their diabetes condition cannot be reverted back.

Other causes included external forces such as God, karma, being unlucky, altered immunity, pollution in the environment, and accident or injury. Finally, misconceptions included that 'it is common to get', 'consumptions of bananas in childhood',

'consumption of mangoes', 'excessive sweets', 'excessive food intake', 'consumption of junk food', 'body type', and 'everyone gets so I have it'. This finding needs attention. Even though the number of participants reporting misconceptions is less, it is very crucial to tackle such beliefs as they can lead to incorrect decisions towards health behaviours. These misconceptions can be dispelled by educating the participants.

Attributing diabetes to factors like God and luck might influence participants' diabetes self-management behaviour. Though this was not assessed in the present study but it indicated external orientation towards their health and illness management. However, studies have shown that patients who perceived that their illness is controlled by powerful others were less likely to involve in health behaviours (Wallston, 2005). Often health and illness were viewed as a balance between individuals and supernatural world (Helman, 2007).

Facilitating Factors to Diabetes Self-Management

Qualitative approach was utilized to explore the factors that facilitate participants' diabetes self-management. Participants were able to report a range of factors that influenced their management of diabetes in a positive manner. The factors that facilitated participants' diabetes self-management are mentioned below.

Beliefs are considered to be crucial in most of the health and illness models as they directly influence the way individuals cope with the illnesses. Belief in the self was one prominent aspect indicated by the participants. Participants reported believing in 'one self' (self-efficacy) to manage diabetes effectively. This finding is supported by a study in which self-efficacy was found to have a direct effect on self-care specific to diabetes

(Devarajoo & Chinna, 2017). Belief in God was another prominent factor reported by participants in facilitating their diabetes self-management. Some of the participants considered God as source of healing. This finding is supported by a previous study conducted on diabetic patients where the 'divine' was reported to be the major source of hope and strength (Gupta & Anandarajah, 2014).

Participants in both high and low diabetes self-management group had unanimously reported social support as one of factors facilitating in their diabetes self-management. One of the participants reported that the spouse used to collect information about diabetes related facts and keep the participant informed about it. This is in line with the findings of a study where family member was indicated as a source of health information (Onwudiwe et al., 2014). Participants reported that their family members, children and spouse were primary care providers. Some of their family members were medical professionals (a doctor and a nurse) who had accurate knowledge about diabetes and its treatment, and they were able to impart knowledge to the participants. Diabetes self-management is multimodal, involves psychosocial factor and requires assistance from family, physicians and health-care system. Diabetes self-management usually takes place in a social setting of family and friends, health-care professionals, and the community, and each of these can influence patient's adherence (Barrera et al., 2006). Those who reported receiving better support to manage their illness were found to exhibit better physical activity, dietary outcomes, better compliance to blood glucose monitoring, and better diabetic control than those people with lesser support (King et al., 2010; Brody et al., 2008).

Research by Patel et al (2015) on diabetic individuals demonstrated the significance of family members in supporting lifestyle modification and diet control. Receiving social support implies material and spiritual support that a person gains from his/her social relationships to lessen psychological stress and relieve tension and improve social adaptability (Ye et al., 2008). Work of Carolan, Gill, and Steele (2012) reported that psychological support from families and partners acts as a facilitating factor in gestational diabetes self-management among pregnant women. Better social support results in better perseverance of self-management (King et al., 2010).

Persistent care was another facilitating factor. Participants reported that continuous care is required to achieve and maintain optimal blood glucose levels. Following treatment regime every day and integrating it with routine activities is shown to lead to better diabetes control. The participants reported of following a strict diet, visiting of doctors regularly, and testing of blood glucose level. Finally, knowledge about diabetes is another aspect reported by participants as a facilitating factor. Reading about diabetes related facts, and learning information from family members who were medical professionals helped participants to manage their diabetes more effectively. Learning on their own gave them sense of satisfaction as they felt that they were directly involved with their disease management. Many of the studies involving cross sectional approaches have revealed that knowledge about diabetes influences diabetes self-management in a positive way. In their study Jeong, Park, and Shin, (2014) indicated that diabetes knowledge, exercise and experiences of diabetes education were related to increased self-care activities among elderly diabetic patients after controlling for variables like education, gender, subjective health state and health literacy. In another study health

literacy was found to have indirect effect on self-care and glycemic control via its relationship with social support (Osborn, Bains, & Egede, 2010). A review highlighted education, communication, personal factors, support and provider issues as the major issues influencing individual's ability towards self-care (Wilkinson, Whitehead, & Ritchie, 2014). The participants in the present study emphasized on the significance of knowledge regarding diabetes and significance of each element of diabetes self-management. It was noted from a study that, in order to obtain better medication adherence, the participants considered knowledge about illness and medication as important. The participants also placed greater importance on illness characteristics such as presence of comorbid conditions or complications and chronicity (Barba et al., 2017). Hoping for a healthier future was one of the motivating factors for few participants in sustaining efforts towards better diabetes management.

Barriers to Diabetes Self-Management

Qualitative approach was also utilized to explore the factors that inhibit or act as a barrier to diabetes self-management. Participants were able to identify few barriers that inhibited their diabetes self-management. Lack of financial resources was one of the barriers to diabetes self-management. Participants reported that cost of medicine, blood glucose testing, transportation, and doctor's fees posed burden on finances. This finding is consistent with a study where Type 2 diabetes patients reported financial barrier as one of the factors challenging their adherence (Al-Qazaz, Hassali, Shafie, Sulaiman, & Sundram, 2011). In another study lower income was found to be related to poor adherence to diabetic medications (Rolnick, Pawloski, Hedblom, Asche, & Bruzek, 2013). Illness management is a lifelong process and it involves substantial amount of expenditure

towards medical care. Increasing prevalence of diabetes poses economic burden to the country and interrupts family's financial structure. In a study it was found that for diabetes treatment, low-income (more than 60 %) group had to borrow or mortgage their property and high income (approximately 70-80%) group were found to spend large part of their personal savings on treatment (Tharkar, Devarajan, Kumpatla, & Viswanathan, 2010). Another study conducted in South India revealed the increasing expenditure incurred by individuals with diabetic complications in urban settings (Ramachandran et al., 2007). Hence it can be derived that financial burden borne by diabetes patients and their families largely depends on their economic status. A study reported that health insurance had a meagre role in lessening the medical expenses of individuals with diabetes (Smith-Spangler, Bhattacharya, & Goldhaber-Fiebert, 2012) in low and middle-income countries.

Social obligations are another prominent barrier reported by participants for their poor diabetes self-management. Participants reported that avoiding certain foods (dietary recommendations) on some occasions was difficult such as social gathering where high calorie foods are served. Resisting such foods was difficult. This indicates that individuals feel social pressure to consume foods that are not recommended for a diabetic patient. It has been demonstrated that during the times of stress or social pressure the dietary and exercise adherence often decreases among diabetic patients (Cramer, 2004). Lack of informational support from physician was another barrier indicated by participants. They reported feeling tensed due to limited information received and expected more information from the doctor. Studies have reported the barriers pertaining to physicians that influence the self-care of patients. Review indicated that lack of time

and collaboration from physicians were barriers towards self-care communication (Beverly, Worley, Court, Prokopakis, & Ivanov, 2016). A study has shown that many health care providers tend to not discuss self-care activities with their patients even though they sought their guidance (Centers for Disease Control and Prevention, 2002). On the contrary there are some studies where patients reported their physician as a source of health information (Onwudiwe et al., 2014). Some of the possible reasons might be the communication gap between patient and provider. Patients sometimes hesitate to get clarity regarding their condition, and expect their physicians to initiate the process of disseminating information. This explanation is rooted in investigators personal experience during data collection when one of the participants approached the investigator with some doubts regarding diabetes with hesitation. Patient's lack of education and physician's gender might also be possible reasons.

Few participants did not emphasize on exercise and dietary recommendations. It indicated the poor value assigned to certain elements of illness management and health in general. However they reported taking medications. This finding is supported by a research on diabetic patients where they rated medication more important as compared to diet and exercise and indicated higher adherence to medications (Broadbent et al., 2011). However, it has been demonstrated that complete adherence to medication and lifestyle regimen is rare (Cramer, 2004). Firstly, complexity makes compliance more difficult, and second, implementing lifestyle changes is more difficult in comparison to taking medication. As a result poor adherence is common and improving adherence to treatment recommendations is of primary concern to psychologists involved in providing care for diabetic patients. A study conducted including Type 2 diabetes patients in Southern India

revealed that self-care in relation to diet and exercise was poor and self-care in relation to monitoring of blood sugar and medication adherence were good (Gopichandran et al., 2012). This indicates that patient tend to assign less significance to certain aspects of diabetes self-management.

Presence of joint pains was reported as one of the barriers for not following exercise recommendations. Having comorbid conditions was observed to hinder exercise compliance and this finding is supported by previous research (Balhara & Sagar, 2011). As previously mentioned the demands placed on the diabetic patients, due to strict adherence to a complex regimen including monitoring of blood sugar levels, preparing special meals, and medication intake, can sometimes be difficult and frustrating, which may lead to emotional distress. These tasks become even more challenging when the patient suffers from comorbid conditions. Comorbid conditions were shown to have profound effect on patients' ability to manage their illness. Diabetes self-management needs a substantial investment of patient's time (Safford, Russell, Dong-Churl, Roman, & Pogach, 2005; Russell, Suh, & Safford, 2005). The extent of time and energy required for diabetes self-care could be substantially reduced when comorbid conditions are to be managed simultaneously. Adherence to medication alone can be difficult in the scenario when patients are juggling treatment regimens for multiple conditions (Bayliss, Steiner, Fernald, Crane, & Main, 2003; Noël, Chris Frueh, Larme, & Pugh, 2005). Also, comorbid conditions can pose extra financial burden on diabetic patients by increasing their medical care costs. Developing effective interventions for improving diabetes self-management in the context of comorbidities might assist patients in attaining positive health outcomes. The study's findings are supported by a study conducted by Gracia-

Perez and colleagues (2013), where reasons for non-adherence were shown to include information about the disease, perceptions, and financial factors.

Limitations and Future Directions

In this study the participants were recruited from two diabetic clinics which highlight potential for selection bias and could be considered a methodological limitation. Data were obtained from only one geographical location, inclusion of data from other major parts of India and a larger sample size would have been a more representative sample. Self-reported questionnaires were given to participants and hence it is difficult to distinguish true behaviour, perceptions or beliefs. In other words, no measures were employed to avoid social desirability bias. No claims can be made about the causal relationship between the factors. Education, marital status, and employment status were not considered into the analysis due to certain missing data. Predictive role of causes and identity were not examined which might explain variance in diabetes self-management and its components. However, these points will be considered in future while extending the study. The Cronbach alpha value for the subscale health-care use was found to be lower than acceptable level.

Future studies could recruit larger sample size, examine gender differences in variables in Indian context and with limited age range and duration of diabetes. Reinforcing self-management through interventions might further boost their confidence and competence to sustain healthy behaviours in the future. Effective interventions are required addressing barriers to diabetes self-management and misconceptions regarding causes and facilitate optimal diabetes self-management. Health professionals, researchers, and policy makers, need to effectively work in collaboration towards eliminating barriers

and misconceptions. Despite these limitations, the findings of the present study emphasize the significance of addressing patients' perceptions of their illness and building their health hardiness as a starting point for psychosocial interventions targeted at improving self-management and optimizing treatment outcomes.

Implications

Assessing illness perceptions not only helps how individuals understand and respond to illness but also offers a theory-based intervention target to improve outcomes. Utilizing available and tailor-made interventions to enhance personal control, treatment control, illness coherence, health value, internal locus of control and perceive health competence could be done as these elements were found to predict diabetes self-management behaviours. Emotional worries due to illness can be intervened through psychosocial modules. Addressing misconceptions regarding causes of diabetes and barriers to diabetes through psychosocial interventions is an important outcome of the study.

The important task for psychological research in the area of health is to understand the factors that influence adherence to medical regime. One of the greatest challenges for individuals suffering with diabetes is trying to know how to acquire and maintain necessary skills required for effectively self-managing diabetes. Conversely healthcare providers also tend to face the challenge of 'how' while addressing the continued needs and demands of people with diabetes.

Though ample of information is available from various sources such as family members, internet, peers and so on, still patients find information from the physician

more reliable. Disseminating accurate information could be carried out in different ways. In this context, providing information from a psychologist would be beneficial given the disproportionate doctor patient ration and the limited consultation time in Indian context. A step before this would be employing health psychologist in hospitals trained in the area of diabetes management is necessary, which is lacking in many hospitals in India. The role of health psychologist is prominent as they could work in collaboration with physician and hospital team in administering assessments, providing psychosocial interventions, and conducting awareness programs.

Health psychologists study diabetes patients' understanding of their illness and how this understanding influences their behavior. They channelize their efforts towards enhancing adherence to treatment regimens so that diabetic patients could control their blood glucose levels and minimize health complications. Health psychologist's role in diabetes management is prominent as behavioural components are integral part of psychological and education-based programmes, though the role of situational factors cannot be ruled out. As diabetes self-care can have a huge impact on reducing glycosylated haemoglobin levels, educators and health care providers must evaluate patients' perceived barriers to self-care and make recommendations accordingly.

Conclusion

The findings of the present study indicate that the illness perceptions predict diabetes self-management among individuals with Type 2 diabetes. This demonstrates that Leventhal's common sense model is fairly robust in elucidating patients' reflections and thoughts in their effort to cope with a condition such as diabetes. Findings of the study indicate that perceptions of personal control were the significant individual

predictor of overall diabetes self-management and its components. Concerning health hardiness following components namely health value and internal health locus of control were significant individual predictors of overall diabetes self-management, glucose management and health-care use whereas health value was significant predictor for physical activity and health value and perceived health competence for dietary control. Health hardiness components explained higher amount of variance in overall diabetes self-management and its components. Various demographic variables and disease characteristics were shown to predict diabetes self-management in the sample. These characteristics need to be taken into consideration while addressing the needs of the participants for positive outcomes.

The study identified factors that facilitate individual's diabetes self-management process and these were— support from family members, belief in self and God, persistent care, knowledge about diabetes and wish for a healthier future. Certain barriers were also identified that were influencing participants' management towards their illness in a negative way. The barriers were social constraints (lack of financial resources and social obligations), presence of comorbid conditions, lack of informational support from physician, and poor health value. The findings correspond with theoretical framework as well as with the results of other published studies. Findings suggest that these barriers could be modified utilizing psychosocial interventions.

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Institute Ethics Committee, University of Hyderabad

Justice Rangarajan
Chairperson

Prof. Geeta K. Vemuganti
Member Secretary

Decision Letter of Institute Ethics Committee,

IEC No Application No:	UH/IEC/2014/119	Date of review	9.09.2015
Project Title:	Self-Management and HbA1c: Impact of illness Perceptions and Hardiness among Type2 diabetics		
Principal Investigator/ Co-PI:	Ms.Chelli Kavya Dr.Meera Padhy		
Participating Institutes if any	---	Approval from Participating Institute	---
Documents received and reviewed	Protocol, ICF and Data collection tool		
In case of renewal submission of update	-----		
Decision of the IEC:	Approved Duration of Approval: One year from date of approval		
Any other Comments Requirements for conditional Approval	-----		
Members Present	Sri Justice Rangarajan, Prof.Geeta K.Vemuganti, Dr.B.Sesikeran, Prof.Aparna Dutta Gupta, Prof.Meena Hariharan ,Dr.Mahadev Kalyankar, Ms.M.Varalakshmi		

Please note:

- Any amendments in the protocol must be informed to the Ethics committee and fresh approval taken.
- Any serious adverse event must be reported to the Ethics Committee within 48 hours in writing (mentioning the protocol No. or the study ID)
- Any advertisement placed in the newspapers, magazines must be submitted for approval.
- The results of the study should be presented in any of the academic forums of the hospital annually.
- If the conduct of the study is to be continued beyond the approved period, an application for the same must be forwarded to the Ethics Committee.
- It is hereby confirmed that neither you nor any of the members of the study team participated in the decision making/voting procedures.

Chairperson

(Justice Rangarajan)

Member Secretary

(Prof. Geeta K Vemuganti)
Member Secretary
Institutional Ethics Committee (IEC)
School of Medical Sciences
University of Hyderabad
Hyderabad-500046.

Address : School of Medical Sciences, University of Hyderabad, C.R. Rao Road, Gachibowli, Hyderabad - 500 046.

Tel (O) : +91-040-23134781 / 23013279

E-mail : iec_uoh@uohyd.ernet.in. deanmd@uohyd.ernet.in

INFORMED CONSENT FORM

University of Hyderabad
Centre for Health Psychology

Title of the Study : Impact of Illness Perceptions and Health Hardiness on
Diabetes Self-Management among Type 2 Diabetes patients
Investigator : Ms. Chelli Kavya, PhD Research Scholar

In order to participate in this study, it is necessary that you give your informed consent. By signing this informed consent statement you are indicating that you understand the nature of the study, your role in it and that you agree to participate in the study.

When filling out the questionnaires or answering to the (Interview) questions asked, you may come across a question or an answer choice that you find unpleasant, upsetting or otherwise objectionable. For instance, a few of the questions may cause you to think of negative emotional states. You may also feel that you have performed poorly, but there is no right or wrong answer. You will be asked to provide confidential information (such as age, marital status, education, and employment, onset of illness, blood- glucose values, and co-morbid conditions) about yourself. When your participation is complete, you will be given an opportunity to learn about this study, which may be useful to understanding yourself and others. You will have an opportunity to contribute to the discipline of psychology by participating in this study.

Please consider the following points before signing:

- I understand that I am participating in a psychological study.
- I understand that I have to provide my blood sugar readings (as given in my medical record file).
- I understand that by participating in this study, I don't have to stop my medication prescribed for my diabetes by my physician.
- I understand that my identity will not be linked with my data, and that all information I provide will remain confidential and will only be used for research purpose.
- I understand that the participation in the study is voluntary. If I decide now or at any point to withdraw this consent or stop participating, I am free to do so at no penalty to myself.
- I understand that I will not receive any reward/payment/reimbursement for my participation in the study.

By signing this form I am stating that I am over 18 years of age, and that I understand the above information and consent to participate in the study.

Person's to be contacted in case of any doubts/clarification/information

Chelli Kavya (Research Investigator)

Ph. No. 9885740871

Email. Id: kavyahcu@gmail.com

Signature of the participant with date

సమ్మతి ప్రకటన పత్రం
హైదరాబాద్ కేంద్ర విశ్వవిద్యాలయం
సెంటర్ ఫర్ హెల్త్ సైకాలజీ

పరిశోధన శీర్షిక: టైప్-II మధుమేహరోగుల స్వీయ నిర్వహణపై అనారోగ్య అవగాహన మరియు ఆరోగ్యపుష్టి యొక్క ప్రభావం.

పరిశోధకురాలు: కుమారి చెల్లి కావ్య, పీహెచ్డీ రీసెర్చ్ స్కాలర్, సైకాలజీ.

ఈ పరిశోధనలో (రీసెర్చ్) పాల్గొనేందుకు మీ సమ్మతి అవసరం. ఈ సమ్మతి కాగితంపై సంతకం చేయడం ద్వారా మీరు ఈ పరిశోధన యొక్క స్వభావం, ఇందులో మీ పాత్ర అర్థమైంది అని ఇందులో పాల్గొనేందుకు మీరు అంగీకరిస్తున్నారు అని సూచిస్తున్నారు.

ప్రశ్నాపత్రాలు పూర్తి చేసి మరియు ఇంటర్వ్యూ ప్రశ్నలకు సమాధానం ఇచ్చే ప్రక్రియలో మీకు ఆహ్లాదం కలిగించని, బాధాకరమైన లేదా అభ్యంతరకరమైన ప్రశ్నలు, సమాధానాల ఎంపిక ఎదురుకావచ్చు. ఉదాహరణకి కొన్ని ప్రశ్నలు ప్రతికూల భావోద్వేగాలని (నెగిటివ్ ఎమోషన్స్) రేకెత్తించవచ్చు. ఈ ప్రశ్నపత్రంలో మీరు ఇచ్చే జవాబులకు సరైనా లేదా తప్పు సమాధానాలు ఏమీ లేవు అని గుర్తించాలి. మీ వ్యక్తిగత సమాచారానికి సంబంధించిన ప్రశ్నలకు జవాబులు మీరు ఇవ్వాలి (ఉదాహరణకు మీ వయస్సు, వైవాహికస్థితి, విద్యార్హతలు, ఉపాధి, అనారోగ్యం ఎప్పుడు మొదలయింది, రక్త గ్లూకోజ్). పాల్గొనడం పూర్తి అయినప్పుడు, మీకు ఈ పరిశోధన గురించి తెలుసుకోవడానికి అవకాశం ఇవ్వబడుతుంది. ఇది మిమ్మల్ని మరియు ఇతరులని అర్థం చేసుకోవడానికి ఉపయోకరంగా ఉంటుంది. ఈ పరిశోధనలో పాల్గొని సైకాలజి శాస్త్రానికి సహకరించే అవకాశం ఉంటుంది.

ఈ క్రింద ఇవ్వబడిన అంశాలను జాగ్రత్తగా చదవండి:

- నేను ఒక మానసిక (సైకాలజీ) పరిశోధనలో పాల్గొనుచున్నాను అని అర్థమైంది
- నేను నా రక్తంలో చక్కెర రీడింగులను (నా వైద్య రికార్డు ఫైలులో ఇవ్వబడిన రీడింగు) అందించాలి అని అర్థమైంది.
- నేను ఈ పరిశోధనలో పాలుపంచుకోవడం ద్వారా, నా వైద్యుడు సూచించిన నా మధుమేహ (షుగర్/డయాబెటిస్) మాత్రలు ఆపి అవసరం లేదు అని అర్థమైంది.

- నా గురించి నేను ఇచ్చిన సమాచారం రహస్యంగా ఉంచబడుతుందని మరియు పరిశోధన నిమిత్తం ఉపయోగబడుతుంది అని అర్థమైంది.
- ఈ పరిశోధనలో నేను పాల్గొనటం స్వచ్ఛందము (వాలంటరీ) అని అర్థమైంది. ఎటువంటి జరిమానా లేకుండా ఏ సమయంలోనైనా ఈ సమ్మతి వెనక్కి తీసుకోవచ్చు అని అర్థమైంది.
- నేను ఈ పరిశోధనలో పాలు పంచుకోవడం ద్వారా నాకు ఏ రకమైన బహుమతి లేదా పరిహారం ఇవ్వబడదు అని అర్థమైంది

నా వయస్సు 18 సంవత్సరాలు లేదా అంతకన్నా ఎక్కువ అని పైన ఇవ్వబడిన సమాచారాన్ని పూర్తిగా అర్థం చేసుకున్నానని మరియు ఈ పరిశోధనలో పాల్గొనడానికి నా సమ్మతిని ప్రకటిస్తున్నానని ఈ పత్రంపై సంతకం చేయడం ద్వారా తెలియజేస్తున్నాను.

ఈ పరిశోధనకి సంబంధించిన అనుమానాలు లేదా సందేహాలు ఉన్నట్లయితే సంప్రదించవలసిన వ్యక్తి:

చెల్లి కావ్య (రీసర్చ్ పరిశోధకురాలు)

Ph. No. 9885740871

Email. Id: kavyahcu@gmail.com

తేదీ మరియు పాల్గొనే వ్యక్తి యొక్క సంతకం

Demographic form

Name/పేరు:

Gender/స్త్రీ/పురుషుడు:

Age/ వయస్సు:

Duration of diabetes/అనారోగ్యం ఎప్పుడు మొదలయింది:

Comorbid conditions/ సహ వ్యాధులు:

Use of insulin/ ఇన్సులిన్ ఉపయోగం:

Place of residence/ నివాస ప్రదేశం:

Employment/ఉపాధి:

Education/విద్యార్హతలు:

Marital status/వైవాహికస్థితి

Primary care provider/ ప్రధాన సంరక్షకుడు:

Revised Illness Perception Questionnaire (IPQ-R)

Your views about your diabetes

Listed below are a number of symptoms that you may or may not have experienced since your diabetes. Please indicate by circling *Yes* or *No*, whether you have experienced any of these symptoms since your diabetes, and whether you believe that these symptoms are related to your diabetes.

	I have experienced this symptom since my diabetes			This symptom is related to my diabetes	
	Yes	No		Yes	No
Pain	Yes	No		Yes	No
Sore Throat	Yes	No		Yes	No
Nausea	Yes	No		Yes	No
Breathlessness	Yes	No		Yes	No
Weight Loss	Yes	No		Yes	No
Fatigue	Yes	No		Yes	No
Stiff Joints	Yes	No		Yes	No
Sore Eyes	Yes	No		Yes	No
Wheeziness	Yes	No		Yes	No
Headaches	Yes	No		Yes	No
Upset Stomach	Yes	No		Yes	No
Sleep Difficulties	Yes	No		Yes	No
Dizziness	Yes	No		Yes	No
Loss of Strength	Yes	No		Yes	No

We are interested in your own personal views of how you now see your current diabetes.

Please indicate how much you agree or disagree with the following statements about your diabetes by ticking the appropriate box.

	Views about your diabetes	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
IP1	My diabetes will last a short time					
IP2	My diabetes is likely to be permanent rather than temporary					
IP3	My diabetes will last					

	for a long time					
IP4	This diabetes will pass quickly					
IP5	I expect to have this diabetes for the rest of my life					
IP6	My diabetes is a serious condition					
IP7	My diabetes has major consequences on my life					
IP8	My diabetes does not have much effect on my life					
IP9	My diabetes strongly affects the way others see me					
IP10	My diabetes has serious financial consequences					
IP11	My diabetes causes difficulties for those who are close to me					
IP12	There is a lot which I can do to control my symptoms					
IP13	What I do can determine whether my diabetes gets better or worse					
IP14	The course of my diabetes depends on me					
IP15	Nothing I do will affect my diabetes					
IP16	I have the power to influence my diabetes					
IP17	My actions will have no affect on the outcome of my diabetes					
IP18	My diabetes will improve in time					
IP19	There is very little that can be done to improve my diabetes					
IP20	My treatment will be effective in curing					

	my diabetes					
IP21	The negative effects of my diabetes can be prevented (avoided) by my treatment					
IP22	My treatment can control my diabetes					
IP23	There is nothing which can help my condition					
IP24	The symptoms of my condition are puzzling to me					
IP25	My diabetes is a mystery to me					
IP26	I don't understand my diabetes					
IP27	My diabetes doesn't make any sense to me					
IP28	I have a clear picture or understanding of my condition					
IP29	The symptoms of my diabetes change a great deal from day to day					
IP30	My symptoms come and go in cycles					
IP31	My diabetes is very unpredictable					
IP32	I go through cycles in which my diabetes gets better and worse					
IP33	I get depressed when I think about my diabetes					
IP34	When I think about my diabetes I get upset					
IP35	My diabetes makes me feel angry					
IP36	My diabetes does not worry me					
IP37	Having this diabetes makes me feel anxious					
IP38	My diabetes makes					

	me feel afraid					
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Causes of my diabetes

We are interested in what you consider may have been the cause of your diabetes. As people are very different, there is no correct answer for this question. We are most interested in your own views about the factors that caused your diabetes rather than what others including doctors or family may have suggested to you. Below is a list of possible causes for your diabetes. Please indicate how much you agree or disagree that they were causes for you by ticking the appropriate box.

	Possible causes	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
C1	Stress or worry					
C2	Hereditary - it runs in my family					
C3	A Germ or virus					
C4	Diet or eating habits					
C5	Chance or bad luck					
C6	Poor medical care in my past					
C7	Pollution in the environment					
C8	My own behavior					
C9	My mental attitude e.g. thinking about life negatively					
C10	Family problems or worries					
C11	Overwork					
C12	My emotional state e.g. feeling down, lonely, anxious, empty					
C13	Ageing					
C14	Alcohol					
C15	Smoking					
C16	Accident or injury					
C17	My personality					
C18	Altered immunity					

In the table below, please list in rank-order the three most important factors that you now believe caused YOUR diabetes. You may use any of the items from the box above, or you may have additional ideas of your own.

The most important causes for me:

1. _____

2. _____

3. _____

అనారోగ్యం అవగాహన ప్రశ్నావళి (ఐపిక్యూ-ఆర్)

మీ మధుమేహం గురించి మీ అభిప్రాయాలు

క్రీంద అనేక (వ్యాధి) లక్షణాలు ఇవ్వబడ్డాయి, మీరు ఈ లక్షణాలను మీ మధుమేహం నిర్ధారణనుండి అనుభవించి ఉండచు లేక అనుభవించకపోవచ్చు. మీరు ఈ లక్షణాలను మీ మధుమేహం నిర్ధారణ నుండి అనుభవించారో లేక అనుభవించలేదో అని మరియు ఈ లక్షణాలు మీ మధుమేహానికి సంబంధించి అని నమ్మకం ఉంటే క్రీంద ఈ వబడిన అవును లేక/లేదు ఎంపికలు చుట్టుముట్టే సూచించండి.

	నేను ఈ లక్షణాన్ని నా మధుమేహం నిర్ధారణనుండి అనుభవించాను		ఈ లక్షణం నా మధుమేహానికి సంబంధించినది	
	అవును	కాదు	అవును	కాదు
నొప్పి	అవును	కాదు	అవును	కాదు
గొంతులో నొప్పి/గొంతునొప్పి	అవును	కాదు	అవును	కాదు
వాంతి వస్తున్నట్లు ఉండటం	అవును	కాదు	అవును	కాదు
ఊపిరి అందకపోవడం/ఊపిరి యాడనిస్థితి	అవును	కాదు	అవును	కాదు
బరువు తగ్గడం	అవును	కాదు	అవును	కాదు
అలసట	అవును	కాదు	అవును	కాదు
కీళ్లు బిగుసుకోవడం	అవును	కాదు	అవును	కాదు
కాళ్ళ సమస్యలు	అవును	కాదు	అవును	కాదు
పిల్లికూత/గుర్తు గుర్రమను శ్వాస శబ్దము	అవును	కాదు	అవును	కాదు
తలనొప్పి	అవును	కాదు	అవును	కాదు
కడుపు సరిగా లేకపోవడం	అవును	కాదు	అవును	కాదు
నిద్రకి సంబంధించిన ఇబ్బందులు	అవును	కాదు	అవును	కాదు
తలతిరగడం	అవును	కాదు	అవును	కాదు
ఓపిక/శక్తి లేకపోవడం	అవును	కాదు	అవును	కాదు

మీప్రస్తుత మధుమేహంగురించి మీకున్న వ్యక్తిగత అభిప్రాయాలు తెలుసుకోవడం మాముఖ్యఉద్దేశ్యం.

మీమధుమేహంగురించి క్రిందిఇవ్వబడిన వాక్యాలపట్ల మీ అంగీకారము లేక అసమ్మతిని వాటికి సంబంధించిన డబ్బాలలో టిక్కెట్టి తెలియపరచండి.

	మీ మధుమేహం గురించి అభిప్రాయాలు	పూర్తిగావ్యతిరేకిస్తాను/ తీవ్రంగావిభేదిస్తాను	వ్యతిరేకిస్తాను/ విభేదిస్తాను	అంగీకరించాను మరియు వెతిరేకించాను	అంగీకరిస్తాను	పూర్తిగా అంగీకరిస్తాను
ఐపి 1	నా మధుమేహం కొంచెం కాలం సాగుతుంది					
ఐపి 2	నా మధుమేహం తాత్కాలికంగా కాకుండా శాశ్వతంగా ఉండే అవకాశం ఉంది					
ఐపి 3	నా మధుమేహం చాల కాలం ఉంటుంది					
ఐపి 4	ఈ మధుమేహం త్వరగా ముగిస్తుంది					
ఐపి 5	నమిగిలిన జీవితం అంత నేను మధుమేహం కలిగి ఉంటాను అని అనుకుంటు నాను					
ఐపి 6	నా మధుమేహం ఒక తీవ్రమైన పరిస్థితి					
ఐపి 7	మధుమేహం నాజీవితంపై కీలకమైన పరిణామాలు చూపింది					
ఐపి 8	నామధుమేహం నాజీవితం మీద ఎలాంటి ప్రభావం చూపటంలేదు.					
ఐపి 9	నామధుమేహం- ఇతరులునన్ను చూసే విధానాన్ని ప్రభావితం చేస్తుంది.					
ఐపి 10	నా మధుమేహం వలన తీవ్రమైన ఆర్థిక పరిణామాలు ఉన్నాయి.					
ఐపి	నా మధుమేహం					

11	వలననాకు దగ్గరగా ఉన్న వారికి ఇబ్బంది కలుతోంది.					
12	నా మధుమేహం యొక్క లక్షణాలని నియంత్రించడానికి/అ దుప్పులోఉంచడానికి నేను చేయవలసినవి చాలా ఉన్నాయి					
13	నేను చేసే పనులను బట్టి నా మధుమేహం మెరుగుపడటం లేక క్షీణించటం అనేది ఆధారపడిఉంది.					
14	నా మధుమేహపుయొక్క సమయ వ్యవధి నా మీద ఆధారపడి ఉంది.					
15	నేను చేసే ఏ పనికూడా నా మధుమేహంపై ప్రభావం చూపదు.					
16	నా మధుమేహాన్ని ప్రభావితం చేసే శక్తి నాలో ఉన్నది.					
17	నేను చేసే ప్రయత్నాలు మధుమేహం యొక్క పరిణామాలు పై ఎటువంటి ప్రభావం చూపవు					
18	నా మధుమేహం సమయంలో పాటుమెరుగు పడుతోంది					
19	నా మధుమేహం మెరుగు పట్టానికి చేయగలిగింది చాలాతక్కువ ఉంది.					
20	నేను తీసుకునే చికిత్స/వైద్యం నా					

	మధుమేహాన్ని సమర్థవంతంగా నయం చేస్తుంది.					
ఐపి 21	నా మధుమేహం యొక్క ప్రతికూల ప్రభావాలని నేను ఫొండే చికిత్స ద్వారా నిరోధించవచ్చు/నివారించవచ్చు.					
ఐపి 22	నేను ఫొండే చికిత్స నా మధుమేహాన్ని నియంత్రిస్తుంది					
ఐపి 23	ఏది కూడా నా పరిస్థితిని (మధుమేహం) బాగుచేయలేదు.					
ఐపి 24	నా పరిస్థితి లక్షణాలు నాకు అయోమయంగా అనిపిస్తాయి/అతుచిక్కడంలేదు.					
ఐపి 25	నా పరిస్థితి నాకు రహస్యము అని పిస్తాయి					
ఐపి 26	నా పరిస్థితి నాకు అర్థం కావడంలేదు.					
ఐపి 27	నా అనారోగ్యం యొక్క తలాతోక నాకు తెలియడంలేదు.					
ఐపి 28	నా పరిస్థితి గురించి నాకు పూర్తి అవగాహన ఉన్నది.					
ఐపి 29	నా అనారోగ్య లక్షణాలతో రోజురోజుకీ మార్పులు వస్తున్నాయి.					
ఐపి 30	నా అనారోగ్య లక్షణాలు వస్తూపోతూ ఉంటాయి.					
ఐపి 31	నా అనారోగ్యం పరిస్థితి ఒకే విధంగా ఉండదు.					
ఐపి 32	నా అనారోగ్యం ఒకప్పుడు తగ్గినట్టుగా మరోసారి సమాస్యాత్మకంగా ఉంటుంది.					

ఐపి 33	నా అనారోగ్యం గురించి తలచుకుంటే నాకు నిరాశకలుగు తుంది.					
ఐపి 34	నా అనారోగ్యంవల్ల నేను చాలా చికాకుగా ఉంటుంటాను.					
ఐపి 35	నా అనారోగ్యం నాకు చాలా కోపం తెప్పిస్తుంది.					
ఐపి 36	నా అనారోగ్యం నాకు ఎటువంటి చికాకు కలిగించదు.					
ఐపి 37	నా అనారోగ్యం నన్ను చాలా అదుర్దాకు గురిచేస్తోంది.					
ఐపి 38	నా అనారోగ్యం నాకు చాలా భయాన్ని కలుగ చేస్తోంది.					

నాఅనారోగ్యానికిగలకారణాలు

మీరు క్రింద చెప్పబడిన వాటిలో ఎంత వరకూ ఏకీభవిస్తారో దయచేసి తెలుపగలరు.

	వర్తించేకారణాలు	పూర్తిగా వ్యతిరేకిస్తాను / తీవ్రంగావిభేది స్తాను	వ్యతిరేకిస్తా ను/విభేది స్తాను	అంగీకరించాను మరియు వెతిరేకించాను	అంగీకరి స్తాను	పూర్తిగా అంగీకరి స్తాను
సి1	వత్తిడి లేక బాధలు					
సి2	వంశపారంపర్యం- కుటుంబంలో ఉన్నది					
సి3	వైరస్/క్రిములు					
సి4	తిండి లేక తిండితినే విధానం					
సి5	దురదృష్టం లేక					

	పరిస్థితులు					
సి6	గతంలో సరైన వైద్యం లేకపోవడం					
సి7	వాతావరణ కాలుష్యం					
సి8	నా పద్ధతులు					
సి9	నేను జీవితం గురించి సరైన ఆలోచనా అవలంబించక పోవడం— నామానసిక స్థితి					
సి10	కుటుంబ సమస్యలు					
సి 11	అతిగా పని					
సి 12	నా మానసిక పరిస్థితి— ఒంటరితనం, ఆదుర్దా, నిరాశ, నిస్సహా					
సి 13	వయసు వైపడటం					
సి 14	తాగుడు వంటివి					
సి 15	పోగొత్తాగటం					
సి 16	ప్రమాదం లేక దెబ్బతగలడం					
సి 17	నా వ్యక్తిత్వం					
సి 18	రోగ నిరోధకశక్తిలో మా ర్పులు					

मी मधुमेहाనికి मूख्यमैन कारणलनु मीदृष्टिले, वाटी प्रामुख्यतनु बट्टी क्रींद पट्टीकले वरुसक्रमले प्रायुंदि. पैनचेपु बडिन कारणलु कानी लेदा मीकु अनिपिंके वरे कारणलनु कानी मीरु प्रायवच्छु.

नाड्ढेशुंले मूख्यकारणलु

1.
2.
3.

Revised Health Hardiness Inventory (RHHI-24)

	Statements	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1	Efforts to improve your health are a waste of time					
2	It is difficult for me to find effective solutions for health problems that come my way ^a					
3	I can be as healthy as I want to be					
4	I am bored by all the attention that is paid to health and disease prevention					
5	Typically, my plans for my health don't work out well ^a					
6	I handle myself well with respect to my health					
7	I don't give up easily on efforts to improve my health					
8	I am willing to make daily sacrifices for good health					
9	What's the use of concerning yourself about your health- you'll only worry yourself to death					
10	There is too much emphasis on personal responsibility for health in today's world					
11	No matter how hard I try, my health doesn't turn out the way I would like ^a					
12	I am determined to be as healthy as I can be					
13	Most things that affect my health happen to me by accident					
14	No matter what I do, if I am going to get ill, I will get ill					
15	I am in control of my health					

16	I take care of my health as a matter of principle					
17	I find efforts to change things I don't like about my health, are ineffective ^a					
18	I can pretty much stay healthy by taking care of myself					
19	I'm generally able to accomplish my goals with respect to my health					
20	I succeed in the projects I undertake to improve my health					
21	When something goes wrong with my health, I do everything I can to get to the root of the problem					
22	When I stay healthy, I am just plain lucky					
23	The main thing that affects my health is what I do myself					
24	I am directly responsible for my health					

సవరించిన ఆరోగ్య పుష్టిజాబితా-(ర్ హా హా ఐ -24)

సంఖ్య	వాక్యాలు	పూర్తిగావ్యతిరేకిస్తాను/తీవ్రంగావిభేదిస్తాను	వ్యతిరేకిస్తాను/విభేదిస్తాను	అంగీకరించానుమరియువెతిరికించాను	అంగీకరిస్తాను	పూర్తిగా అంగీకరిస్తాను
1.	మీ ఆరోగ్యాన్ని మెరుగు పరిచేందుకు చేసే ప్రయత్నాలు సమయంవృధా					
2.	నా మార్గంలో వచ్చే ఆరోగ్య సమస్యలకి సమర్థవంత మైన పరిష్కారాలని కనుక్కోవడం నాకు చాలా కష్టం.					
3.	నేను అనుకునంత/కొరుకునంత ఆరోగ్యంగా నేను ఉండగలను.					
4.	నేను ఆరోగ్య మరియు వ్యాధి నివారణకి ఇవ్వబడుతున్న దృష్టిని బట్టి విసుగు చెందాను					
5.	సాధారణంగా, నా ఆరోగ్యం కొరకు వేసే నా ప్రణాళికలు/పథకాలు సఫలమవు					
6.	నా ఆరోగ్యం విషయమైనన్ను నేను జాగ్రత్తగా చూసుకుంటాను.					
7.	నా ఆరోగ్యాన్ని మెరుగు పరిచేందుకు చేసే ప్రయత్నాలను నేను సులభంగా ఆపాను/వదలను					

8.	నేను మంచి ఆరోగ్యం కోసం రోజువారీ త్యాగం చేయడానికి సిద్ధంగా ఉన్నాను					
9.	మీ ఆరోగ్యం గురించి మీరు చింత లేక ఆందోళన చెంది ఉపయోగం ఏమిటి? మీరు మాత్రం మరణం వచ్చే అంత ఆందోళన పడ్డమే.					
10.	నేడు ప్రపంచంలో ఆరోగ్యాన్ని పట్ల వ్యక్తిగత బాధ్యతపై చాలా ప్రాముఖ్యత ఇవ్వబడుతుంది					
11.	నేను ఎంత కఠినంగా ప్రయత్నించినా నా ఆరోగ్యము నేను ఇప్పటికీ విధంగా ఉండదు					
12.	నేను సాధ్యమైనంత వరకు ఆరోగ్యంగా ఉండాలని పట్టుదలతో నిశ్చయించుకున్న/ని ర్ణయించుకున్నా					
13.	నా ఆరోగ్యని ప్రభావితం చేసే విషయాలు నాకు ప్రమాదకారంగా జరుగు తాయి/సంభవిస్తాయి					
14.	నేను ఏమిచేసిన కానీ, ఒకవేళ అనారోగ్యాలు ఆయె పనైతే కచ్చితంగా అవుతాను					
15.	నా ఆరోగ్యం నా					

	ఆధీనంలో నేఉంది					
16.	నేను నా ఆరోగ్యని ప్రాథమిక విషయంగా సంరక్షిస్తాను/చూసు కుంటాను					
17.	నేను నా ఆరోగ్యం గురించి నచ్చని విషయాలు మార్చడానికి చేసేప్రయత్నాలు అసమర్థమవుతాయి					
18.	నేను జాగ్రత్త/శ్రద్ధతీసుకోవడం ద్వారా ఆరోగ్యంగా ఉండగలను					
19.	నేను సాధారణంగా నా ఆరోగ్యానికి సంబంధించినా లక్ష్యాలను/గమ్యాలను (గోల్స్) సాదిస్తాను					
20.	నా ఆరోగ్యాన్ని మెరుగు పరిచేందుకు నేను వేసుకున్న పథకాలన్ని టిలో/ప్రణాళికలో జయిస్తాను					
21.	నా ఆరోగ్యానికి ఏదైనా జరిగినప్పుడు నేను ఆసమస్య యొక్క మూల కారణం తెలుసు కొనుటకు నవోతు ప్రతిదీచేస్తాను					
22.	నేను ఆరోగ్యంగా ఉండడం కేవలం నా అదృష్టం					
23.	నేను నా పట్ల చేసేపనులే ప్రధానంగా నా ఆరోగ్యాన్ని					

	ప్రభావితం చేస్తాయి					
24.	నా ఆరోగ్యానికై నేను నేరుగా భాద్యుతుడని /భాద్యురాలుని					

Diabetes Self-Management Questionnaire (DSMQ)

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.

		Applies to me very much	Applies to me to a considerable degree	Applies to me to some degree	Does not apply to me
1	I check my blood sugar levels with care and attention. <input type="checkbox"/> Blood sugar measurement is not required as a part of my treatment.				
2	The food I choose to eat makes it easy to achieve optimal blood sugar levels.				
3	I keep all doctors' appointments recommended for my diabetes treatment.				
4	I take my diabetes medication (e. g. insulin, tablets) as prescribed. <input type="checkbox"/> Diabetes medication / insulin is not required as a part of my treatment.				
5	Occasionally I eat lots of sweets or other foods rich in carbohydrates.				
6	I record my blood sugar levels regularly (or analyse the value chart with my blood glucose meter). <input type="checkbox"/> Blood sugar measurement is not required as a part of my treatment.				
7	I tend to avoid diabetes-related doctors' appointments.				
8	I do regular physical activity to achieve optimal blood sugar levels.				
9	I strictly follow the dietary recommendations given by my doctor or diabetes specialist.				

10	I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. <input type="checkbox"/> Blood sugar measurement is not required as a part of my treatment.				
11	I avoid physical activity, although it would improve my diabetes.				
12	I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). <input type="checkbox"/> Diabetes medication / insulin is not required as a part of my treatment.				
13	Sometimes I have real 'food binges' (not triggered by hypoglycaemia).				
14	Regarding my diabetes care, I should see my medical practitioner(s) more often.				
15	I tend to skip planned physical activity.				
16	My diabetes self-care is poor.				

మధుమేహం (డయాబటీస్)వ్యక్తిగతసంరక్షణాప్రశ్నావళి/ ప్రశ్నాపత్రం (డియన్ఎమ్కూ)

క్రింద ఇవ్వబడిన వాక్యాలు మీమధుమేహ (Sugar) పరిస్థితి యొక్క సంరక్షణా (సెల్ఫ్కేర్) విధానాలకు సంబంధించినవి. గత ఎనిమిది వారాలలో మీరు తీసుకున్న వ్యక్తిగత జాగ్రత్తలు గురించి బాగా ఆలోచించి క్రిందచెప్ప బడిన వాటిలో మీకు వర్తించే వాక్యాలను గుర్తించండి.

		నాకు పూర్తిగా వర్తిస్తుంది	నాకు చాలావరకూ వర్తిస్తుంది	నాకు కొంతవరకూ వర్తిస్తుంది	నాకు వర్తించదు
1	రక్తంలో చక్కెర పరిమాణాన్ని/స్థాయిలను నేను అతిజాగ్రత్తగా మరియు శ్రద్ధతో పరీక్ష చేసుకుంటాను. <input type="checkbox"/> రక్తంలో చక్కెర కొలత నా చికిత్సలో భాగం కాదు.				
2	నేను తినడానికి ఎంచుకున్న ఆహారం రక్తంలో సరైన చక్కెర స్థాయిలను సాధించడానికి సులభం చేస్తుంది				
3	నా మధుమేహం (షుగర్) వైద్య విధానంలో భాగంగా డాక్టర్చెప్పినట్లుగా వారిని నియమిత సమయంలో కలుస్తాను.				
4	సూచించినా విధానంగా నేను మధుమేహం (షుగర్) మందులను (ఇన్సులిన్, టాబ్లెట్లు) తీసుకుంటాను. <input type="checkbox"/> మధుమేహం మందులు/ ఇన్సులిన్ నా చికిత్సలో భాగం కాదు.				
5	అప్పుడప్పుడు నేను చాలా తీపి పదార్థాలను లేక కార్బోహైడ్రేట్స్ ఎక్కువ మాత్రలో ఉన్న తిండి పదార్థాలను తింటాను.				
6	నేను క్రమంతప్ప కుండా రక్తంలో చక్కెర పరిమాణాన్ని పరీక్షచేసుకుంటాను (లేదా రక్తపరీక్ష				

	<p>చేసే గ్లూకోమీటరు యొక్క చార్జ్ చక్కెర పరిమాణాన్ని పరిశీలించుకుంటాను).</p> <p><input type="checkbox"/> రక్తంలో చక్కెర కొలత నా చికిత్సలో భాగం కాదు.</p>				
7	<p>మధుమేహానికి సంబంధించి డాక్టర్లు కలిసే విషయంలో తపించు కుంటాను.</p>				
8	<p>నేను రక్తంలో సరైన చక్కెర స్థాయి సాధించడానికి నేను క్రమం తప్పకుండా వ్యాయామం చేస్తాను</p>				
9	<p>నేను ఖచ్చితంగా డాక్టర్ లేదా మధుమేహం సెక్షన్లలో ఇచ్చిన ఆహార సిఫార్సులను అనుసరిస్తాను.</p>				
10	<p>రక్తంలో గ్లూకోజ్ నియంత్రణ సాధించడానికి కావలసినంత తరచుగా నా రక్తంలో చక్కెర స్థాయిలను నేను పరీక్షించుకొను. <input type="checkbox"/> రక్తంలో చక్కెర కొలత నా చికిత్సలో భాగం కాదు</p>				
11	<p>నమధుమేహాన్ని మెరుగుపరుస్తుంది అని తెలిసినా కాని వ్యాయామం, శారీరకశ్రమ చేయడానికి ఇష్టపడను.</p>				
12	<p>మధుమేహానికి సంబంధించిన మందులు (ఇన్సులిన్, టాబ్లెట్లు) తీసుకోను లేక తీసుకోవడం మరచి పోతుంటాను. <input type="checkbox"/> మధుమేహానికి సంబంధించిన మందులు / ఇన్సులిన్ నా చికిత్సలో భాగం కాదు</p>				
13	<p>కొన్నిసార్లు నాకు అతిగా తినాలి అనిపిస్తుంది (రక్తములో చక్కెర శాతం తగ్గుటవల్ల కాకపోయినా)</p>				
14	<p>నా మధుమేహం సంరక్షణకు సంబంధించి, నేను చాలా తరచుగా నా వైద్యుని (లు) కలవలి.</p>				
15	<p>నేను ప్రణాళికాబద్ధంగా నియమించుకున్న</p>				

	శారీరకవ్యయామాన్ని చేయను/తప్పించుకుంటా.				
16	నా మధుమేహం స్వీయ సంరక్షణ (శ్రద్ధ/జాగ్రత్త) బలహీనంగా ఉంది				

Impact of Illness Perceptions and Health Hardiness on Diabetes Self-Management among Type 2 Diabetes Patients

by Chelli Kavya

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Effect of Health Hardiness on Illness Perceptions in Type 2 Diabetes Patients

Kavya Chelli*, R. Lalnuntluangi** and Meera Padhy***

Abstract

Illness perceptions that the patients have about their illness and health hardiness play a significant role in various health outcomes in patients. Assessing these two constructs in type 2 diabetes patients might be helpful in designing health promotion strategies, which in turn influence better management of the condition. With this background the study was intended (1) to assess the relationship between health hardiness and illness perceptions and (2) to find out the impact of the health hardiness on illness perceptions in type 2 diabetes patients. Utilizing a correlational design seventy seven individuals with type 2 diabetes were recruited in the study and were administered revised health hardiness inventory-24 and illness perception questionnaire-revised. The results revealed a significant difference between symptoms experienced and symptoms attributed to type 2 diabetes. Both significant positive and negative correlations were observed between health hardiness and illness perceptions. Health hardiness explained significant proportion of variance in illness perceptions. The limitations and implications of the study are discussed.

Keywords: Health Hardiness, Illness Perceptions, Type 2 Diabetes

- 1. Introduction
2. Methodology
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4. Discussion
5. Conclusion

1 *identity- consequences* *cause- timeline- cure control-* *et* *et al* *200* *2000*

201

2

0.7) (0) (et al 2002)

Revised Health Hardiness Inventory-24 (2) (strongly disagree) (strongly agree) (1) (2) (7) (2001)

(2) (0)

(r) (20)

(M) (SD) (7) (2) (1) (p) (0) (M) (SD) (M) (SD)

(7) (2) (0) (p) (0) (M) (SD) (2) (7) (M) (SD) (1) (0) (SD) (1) (7)

Variables	External Health Locus of Control	Perceived Health Competence	Internal Health Locus of Control	Health Value	
1	0.10	0.10	0.10	0.10	
2	0.02	0.11	0.11	0.00	0.02
	0.07	0.22	0.22	0.07	0.07
	0.07	0.10	0.10	0.07	0.07
	0.07	0.10	0.10	0.07	0.07
	0.07	0.10	0.10	0.07	0.07
7	0.10	0.10	0.10	0.10	0.10
	0.10	0.10	0.10	0.10	0.10

*p < 0.05 **p < 0.01

Table 1 shows the correlations between the variables. The correlations are as follows: External Health Locus of Control (EHL) is positively correlated with Perceived Health Competence (PHC) (r = 0.10, p < 0.05), Internal Health Locus of Control (IHL) (r = 0.11, p < 0.05), and Health Value (HV) (r = 0.07, p < 0.05). PHC is positively correlated with IHL (r = 0.22, p < 0.01) and HV (r = 0.07, p < 0.05). IHL is positively correlated with HV (r = 0.10, p < 0.05). Health Value is positively correlated with EHL (r = 0.07, p < 0.05), PHC (r = 0.10, p < 0.05), and IHL (r = 0.10, p < 0.05). The correlations between EHL and IHL (r = 0.07, p < 0.05) and between EHL and HV (r = 0.07, p < 0.05) are also significant.

Predictors	B	SEB	β	t	P
External Health Locus of Control	2.00	1.10	.27	2.02	<0.05
Perceived Health Competence	1.70	0.70	.24	2.43	<0.01
Internal Health Locus of Control	1.70	0.70	.24	2.43	<0.01
Health Value	1.70	0.70	.24	2.43	<0.01

The regression analysis shows that the predictors (EHL, PHC, IHL, and HV) significantly predict the outcome variable. The adjusted R-squared value is 0.20, indicating that 20% of the variance in the outcome variable is explained by the predictors. The F-statistic is 2.02, which is significant at p < 0.05. The beta coefficients for the predictors are: EHL (β = 0.27, t = 2.02, p < 0.05), PHC (β = 0.24, t = 2.43, p < 0.01), IHL (β = 0.24, t = 2.43, p < 0.01), and HV (β = 0.24, t = 2.43, p < 0.01).

$F=72$ and $p<0.001$ indicating a significant difference between the two groups. The mean score for the control group was 27 ($t=2.02$) and $p<0.001$ indicating a significant difference between the two groups. The mean score for the intervention group was 2 .

The regression equation for the dependent variable is N .

Predictors	B	SEB	β	t	P
Control	02	1.17	.07	2.07	.01
R^2	.27				
Adjusted R^2	1.071				
F	.07	$p<0.001$			

The regression equation for the dependent variable is β .

The regression equation for the dependent variable is β . The mean score for the control group was 2 ($R^2=.27$) and $F=72$ ($p<0.001$) indicating a significant difference between the two groups. The mean score for the intervention group was 7 ($t=2.07$) and $p<0.01$ indicating a significant difference between the two groups.

The regression equation for the dependent variable is N .

Predictors	B	SEB	β	t	P
Control	1.02	.70	.00	2.00	.00
R^2	.00				
Adjusted R^2	1.007				
F	10.01	$p<0.001$			

The regression equation for the dependent variable is \hat{a} .

The regression equation for the dependent variable is β . The mean score for the control group was 0 ($R^2=.00$) and $F=72$ ($p<0.001$) indicating a significant difference between the two groups. The mean score for the intervention group was 2.0 ($p<0.001$) indicating a significant difference between the two groups.

Self-efficacy, outcome expectancy and self-management of type 2 diabetes patients

R. Lalnuntluangi, Kavya Chelli, and Meera Padhy

Centre for Health Psychology, University of Hyderabad, Central University, Gachibowli, Hyderabad, Telangana

Many diabetes patients neglect their role in management of diabetes, which requires self-management in addition to medical treatment. This correlational study examined self-efficacy, outcome expectancy and self-management of type 2 diabetes patients. It was hypothesized that self-efficacy and outcome expectancy would be predictors of self-management. Seventy eight patients from different hospitals and clinics of Mizoram were administered the Multidimensional Diabetes Questionnaire and Diabetes Self-management Questionnaire. The results provided considerable support of the hypotheses. The implications of the present findings for intervention of chronic illness, shortcomings of the present study and future directions were discussed.

Keywords: self-efficacy, outcome expectancy, self-management, type 2 diabetes patients

Diabetes is one of the most prevalent non-communicable diseases both in developed and developing countries. It is potentially the third leading cause of death and type 2 diabetes specifically has contributed to the decline of life expectancy (Mercola, 2017). India was home to 61.3 million diabetes patients in 2011 with predictions of 101.2 million diabetics by the year 2030 (IDF Diabetes Atlas, 2013). In the recent past, it has increased at an alarming rate and there is a need to manage and prevent this illness from its widespread.

Diabetes self-management is the cornerstone of diabetes care and is crucial to prevent complications of diabetes. Jordan and Jordan (2010) found that 98% of diabetes care depended on self-care. A study done by Diabetes Control and Complications Trial Research Group (1993) also suggested the importance of adhering to self-management activities in order to prevent the potential complications that are associated with diabetes and to have a sense of control over diabetes. Effective diabetes self-management is influenced by various individual factors. Two such factors include self-efficacy and outcome expectancy. Sarkar, Fisher, and Schillinger (2006) demonstrated the crucial role played by self-efficacy in improving or enhancing an individual's self-management. A study showed that self-efficacy is one of the most important factors contributing to self-management among chronic illness patients, especially diabetes (Shorridge-Baggett, 2001). Another study by Stuijbergen, Seraphine, and Roberts (2000) found that self-efficacy was successful in initiating and maintaining medical behaviours.

Self-efficacy is a concept which was derived from Social Cognitive theory which refers to a person's belief about his/her ability to successfully execute duties and responsibilities. Self-efficacy can be used to describe the interaction between personal and behavioural factors in chronic illness or general health since it involves individual's ability and confidence to perform health behaviours they engage in (Lorig & Holman, 2003). Self-efficacy has been found to contribute to appropriate self-management among patients with various chronic health conditions (Aljaseem, Peyrot, Wissow, & Rubin, 2001). Self-management involved incorporating

personal and behavioural factors into daily performance of recommended activities (Aljaseem et al., 2001); this proved the relevance of self-efficacy for enhancement of self-management.

Outcome expectancy is another factor which can contribute to the enhancement of self-management among diabetes patients. A study by Williams and Bond (2002) involving diabetic patients revealed significant positive relationship between outcome expectancies and self-care for exercise and glucose testing, but not for diet and an average of 10 percent of the variance in self-care was attributed to outcome expectancies. Another study by Wu et al. (2007) found a positive relationship between outcome expectations and self-care behaviour in people with type 2 diabetes in Taiwan.

Self-efficacy and outcome expectancy are two concepts which are closely related. Self-efficacy, the belief about one's ability to successfully perform behaviour, is independent of outcome expectancy, a belief about the likelihood of the behaviour leading to a specific outcome. Hence, self-efficacy and outcome expectancy are two independent entities and have independent outcome on behavioural change (Maddux, Sherer, & Rogers, 1982). Bandura's (2006) social learning theory stated that self-efficacy and outcome expectancy are two major determinants of coping behaviour; this showed that the two concepts worked hand in hand successfully. He also suggested that (a) expected outcomes do not causally influence self-efficacy, but (b) self-efficacy judgments remain valid when causally influenced by expected outcomes. In other words, self-efficacy causally influences outcome expectancies, but not vice versa (Bandura, 2004-2006).

Many studies suggested that there exists a significant relationship between self-efficacy and outcome expectancy (Kobau & DiIorio, 2003; Williams, 2010; Zebracki & Drotar, 2004). A study on chronically ill patients found that self-efficacy and outcome expectancy played significant role in maintaining recommended lifestyle behaviour, which is an important factor of self-management (Kobau & DiIorio, 2003). Lin and Ward (1996) found that self-efficacy and outcome expectancy positively correlated with perseverance of coping effort among chronic low back pain patients.

The present of the study

Self-efficacy and outcome expectancy are among many other factors which are essential to enhance and maintain self-management among

Correspondence should be sent to R. Lalnuntluangi
Centre for Health Psychology, University of Hyderabad
Central University, Gachibowli, Hyderabad, Telangana
E-mail: teteyralte@yahoo.in

diabetes patients. Limited research work have been done on self-efficacy and outcome expectancy taken together among type 2 diabetes patients, especially in Indian context. With this background, the present study was conducted with the following objectives- (a) to examine the relationship between self-efficacy, outcome expectancy and self-management and (b) to find out the impact of self-efficacy and outcome expectancy on self-management of type 2 diabetes patients.

Method

Participants

The present study employed a correlational design which consisted of 78 (47.4% men & 52.6% women) type 2 diabetes patients from different hospitals and clinics in Mizoram, India. The age range of the participants was 30-70 years ($M= 52.8$, $SD= 11.8$). Patients who were diagnosed with type 2 diabetes for more than 10 years and who had a history of cognitive impairment and any mental ailment were not included. The study excluded patients who were diagnosed with type 1 diabetes. Demographic details of the patients were also obtained along with the scales.

Instruments

Multidimensional Diabetes Questionnaire (Talbot, Nowen, Gingras, Gosseilin, & Audit, 1997) comprised of 41 items with 3 sections and 7 sub-scales. For the present study, only the third section was used which had 2 sub-scales, namely, Self-efficacy and Outcome expectancy. The self-efficacy sub-scale included 7 items and Outcome expectancy sub-scale included 6 items which summed up to 13 items altogether. This section of the questionnaire had 11 point rating scale ranging from "not at all" (0) to "very confident" (100). The scores ranged between 0- 1300 and higher scores indicated higher self-efficacy and outcome expectancy accordingly. The internal consistency range of the scale was 0.70 to 0.91. Cronbach's alpha of the present study for self-efficacy is 0.90 and 0.80 for outcome expectancy.

Diabetes Self-Management Questionnaire (Schmitt, Gahr, Hermanns, Kulzer, Huber, & Haak, 2013) was divided into 4 sub-scales namely, glucose management, dietary control, physical activity and health care use which consisted of 15 items altogether. Addition to this, there was one item (16th item) on self-care whose score had to be included only in the sum scale but not in any of the four sub-scales. It is a four point likert scale ranging from "applies to me very much" (3) to "does not apply to me" (0). The Cronbach's alpha of this questionnaire was 0.84. Higher scores indicated higher level of self-management. The observed internal consistent cronbach's alpha value for this scale based on the sample of the present study was found to be 0.75.

Procedure

Approvals were obtained firstly from Ethics Committee of

University of Hyderabad and from respective authorities of selected hospitals and clinics of Mizoram, India, prior to data collection. Data were collected from identified hospitals and clinics and rapport was built with the patients followed by signing of informed consent by the patients. Each patient was informed about the purpose of the study and the amount of time taken to complete the scale. The scales were individually administered on the patients. Each patient was debriefed about the study after the completion of the test administration.

Results

The data were analyzed using descriptive statistics, Pearson's product-moment correlation and multiple linear regression (stepwise method).

Relationship of measures

Table 1 represents the inter-correlation between self-efficacy, outcome expectancy and sub-scales of self-management. Self-efficacy was found to have positive correlation with glucose management sub-scale of self-management, $r= 0.32$, $p<0.01$, with increase in self-efficacy, there was an increase in patients' glucose management. It was also found that there was a significant positive relationship between self-efficacy and sub-scale dietary control of self-management, $r= 0.50$, $p<0.01$, which showed that with an increase in self-efficacy, there was an increase in patients' dietary control. A positive relationship was found between self-efficacy and sub-scale physical activity, $r= 0.39$, $p<0.01$, with increase in self-efficacy there was an increase in carrying out physical activities. Self-efficacy and health care use sub-scale were also significantly correlated, $r= 0.38$, $p<0.01$, with an increase in self-efficacy, there was an increase in patients' health-care use. There was a positive relationship between self-efficacy and self-care, $r= 0.22$, $p< 0.05$, which showed that with an increase in self-efficacy, the patients' rating of their self-care was higher. Self-efficacy positively correlated with the total self-management, $r= 0.54$, $p<0.01$. A positive correlation was also found between self-efficacy and outcome expectancy, $r= 0.50$, $p< 0.01$, which showed that increase in self-efficacy led to an increase in outcome expectancy.

Outcome expectancy was found to have positive correlation with glucose management sub-scale of self-management, $r= 0.40$, $p<0.01$, with increase in outcome expectancy, there was an increase in patients' glucose management. It was also found that there was a significant positive relationship between outcome expectancy and sub-scale dietary control of self-management, $r= 0.32$, $p<0.01$, which showed that with an increase in outcome expectancy, there was an increase in patients' dietary control. There was a positive relationship found between outcome expectancy and physical activity, $r= 0.36$, $p<0.01$, with increase in outcome expectancy there was an increase in carrying out physical activities. Outcome expectancy and health-care use sub-scale were also significantly correlated, $r=0.25$. $p<0.05$, with an increase in outcome expectancy,

Table 1: Correlation between self-efficacy, outcome expectancy and self-management

	GM	DC	PA	HCU	SC	SM Total	OE
Self-efficacy	0.32**	0.50**	0.39**	0.38**	0.22*	0.54**	0.50**
Outcome Expectancy	0.40**	0.32**	0.36**	0.25*	0.30**	0.49**	-

GM- Glucose Management, DC-Dietary Control, PA-Physical Activity, HCU-Health Care Use, SC-Self Care, SM- Total Self-Management Total, OE-Outcome Expectancy, ** $p< 0.01$, * $p<0.05$.

there was an increase in patients' health care use. Positive relationship was found between outcome expectancy and self-care, $r = 0.30$, $p < 0.01$, which showed that with an increase in outcome expectancy, the patients' rating of their self-care also increased. Outcome expectancy also significantly correlated with the total self-management, $r = 0.49$, $p < 0.01$.

Contribution of self-efficacy and outcome expectancy in self-management

Multiple linear regression (Stepwise method) was utilized to examine the contributions of self-efficacy and outcome expectancy in self-management among type 2 diabetes patients and the results are presented in table 2.

The results of multiple regression with stepwise method gave two models. Model 1 with self-efficacy as a single predictor explained

30% of variance in self-management (Adjusted $R^2 = 0.29$) and was significant, $F(1,77) = 32.14$, $p < 0.001$. There was a significant positive relationship between self-efficacy and self-management ($\beta = 0.54$, $p < 0.001$). According to this finding, higher scores in self-efficacy enhanced self-management behaviour.

In model 2, outcome expectancy was added which explained a significant variance, R^2 change = 0.06, $F(1,77) = 7.53$, $p = 0.008$. The model 2 explained 36% of the variance in self-management behaviour (Adjusted $R^2 = 0.34$), and was significant, $F(2,76) = 21.21$, $p < 0.001$. There was a significant positive relationship between outcome expectancy and self-management ($\beta = 0.29$, $p < 0.01$). Thus high outcome expectancy among diabetes patients predicted higher self-management.

Table 2: Summary of multiple regression analysis stepwise for variables

Variables	Self- Management				
	B	SEB	β	T	p value
Model 1 (C= 12.25, $R^2 = 0.30$)					
Self-efficacy	0.01	0.003	0.54	5.67	<0.001
Model 2 (C= 6.08, $R^2 = 0.36$)					
Self-efficacy	0.01	0.003	0.40	3.74	<0.001
Outcome Expectancy	0.02	0.006	0.29	2.74	0.008

C-constant, B-unstandardized beta coefficient, SEB-standardized error of beta, β -standardized beta coefficient, t-t value of beta

Discussion

The objectives of the study were to explore the relationship between self-efficacy, outcome expectancy and self-management and also to examine the contributions of self-efficacy and outcome expectancy on self-management among type 2 diabetes patients. The results of the study showed self-efficacy, outcome expectancy and self-management were positively correlated. It was also found that self-efficacy and outcome expectancy contributed to self-management of type 2 diabetes patients.

The findings of the study revealed positive correlations between self-efficacy and all the sub-scales of self-management which means that with an increase in self-efficacy there was also an increase in self-management sub-scales, namely, glucose management, dietary control, physical activity, health care use and self-care. This finding is in accordance with the previous studies which found that self-efficacy has a positive correlation with glycemic control (Trief et al., 2009); maintaining healthy diet (Mohebi et al., 2013); and self-care behaviour (Manjula & Premkumar, 2015). A study done by Dutton et al. (2009) also revealed similar result which focused on an indirect effect of self-efficacy on enhancement of physical activities. This may be explained through self-efficacy theory where a person with high self-efficacy feels competent enough to carry out tasks that are vital for management of diabetes, hence increased their self-initiation activities which in turn will have positive effect on self-management.

The study also found a significant positive correlation between outcome expectancy and sub-scales of self-management. A study

among type 1 diabetes patients found a significant positive relationship between outcome expectancy and self-management where an increase in outcome expectancy resulted in an increase in maintaining or enhancing self-management (Klusmann, Musculus, Sproesser, & Renner, 2015; Lanotti et al., 2006). One possible reason could be that if a person highly believes that his/her behaviour is influencing his self-management activities, this will increase his motivation in maintaining his self-management activities.

Results also showed that self-efficacy and outcome expectancy together predicted self-management and also individually. This finding corroborates the results of previous researches (Mielenz, 2013; Prodanuk, 2004) where self-efficacy and outcome expectancy, in combination significantly predicted self-management in type 2 diabetes patients. Another study by Mohebi et al. (2014) found that self-efficacy alone was also found to significantly predict dietary control and self-management. Similarly, outcome expectancy significantly predicted dietary control, which is one of the factors of self-management (Doerksen & McAuley, 2014; Morrison & Stuijbergen, 2014).

The findings of the study contribute to the field of health psychology in Indian context. The study further depicts the relevance of self-efficacy and outcome expectancy in self-management and the role of health psychologists in designing comprehensive management module targeting self-efficacy and outcome expectancy alongside doctors and nurses to enhance diabetes self-management among the patients. The study will also provide resources not only for diabetes patients but also to other chronic illness patients in actively managing their daily activities as

well as their medical regimen, which in turn will help them in avoiding progression of other complications and hence lead a healthier life.

Shortcomings and future direction

The present study has certain limitations. Firstly, it consisted of small sample size and was collected from one place (Mizoram). Secondly, even though the study conceptualized that self-efficacy and outcome expectancy predicted effective self-management, we cannot conclude that their relationship is a cause-effect relationship, it is rather inconclusive. Because performance of successful self-management could also improve self-efficacy and outcome expectancy over time and hence these constructs can have a reciprocal relationship which can be investigated through further research. Thirdly, the study did not take any demographic variables into consideration which can influence effective self-management, such as age, educational qualification, duration of illness, socio-economic status etc. In addition, the study employed only quantitative approach and inclusion of qualitative approach is highly recommended for wider perspective and this will possibly explore other factors that predict self-management among type 2 diabetes patients.

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Conceptual complexity in children's understanding of diabetes

Meera Padhy
Centre for Health Psychology
University of Hyderabad
Hyderabad, Telangana

R. Lalnuntluangi and Kavya Chelli
Centre for Health Psychology,
University of Hyderabad
Hyderabad, Telangana

Meena Hariharan
Centre for Health Psychology
University of Hyderabad
Hyderabad, Telangana

C. Raghavendra Rao

School of Computer and Information Sciences, University of Hyderabad, Hyderabad, Telangana

Diabetes is one of the highly prevalent non communicable diseases (NCD) that has invaded both developed and developing countries. The WHO projections for the world as well as specific countries are highly alarming. Interventions consequent upon these projections must target children who constitute vulnerable population for the projected year. The first stepping stone towards such intervention is to measure the existing knowledge about the disease in children. The present study combined the qualitative and quantitative methods in exploring children's concept of diabetes. A sample of 548 children from three schools studying in class VI through X were administered an open ended question to get data on children's understanding of the concept of diabetes. The data were analyzed qualitatively and quantitatively. The content analyses identified five broad themes, viz., the definition, causes, symptoms, consequences and management of diabetes. Responses indicating misconceptions were grouped separately. A new method of measuring the complexity of the concept was used. The response divergence indicating explanation of the disease across the themes was measured by computing 'Entropy values' using a formula. The response divergence or conceptual complexity was measured for each class. Results indicated a sudden spurt in conceptual complexity in class X. Results also indicated a dismally low level of knowledge about diabetes and large number of misconceptions. Low levels of knowledge and huge misconceptions warrant public health measures through awareness programmes in campaign mode.

Keywords: concept development, concept of diabetes, children's knowledge, entropy, conceptual complexity

The non-communicable diseases (NCDs) also known as life-style diseases are of major concern across the globe. According to Global Status Report on NCDs (2014), non-communicable diseases contribute to around 5.87 million deaths that account for sixty percent of all the deaths in India. Diabetes, a major NCD refers to a condition in which there are high blood sugar levels over a prolonged period. While genetic predisposition is an identified factor, the other major factor related to its etiology is lifestyle. Absence or inadequate exercise, unhealthy dietary habits, heightened levels of stress and obesity are some of the identified risk factors. According to Diabetes Atlas (Diabetes Atlas, 2015) the number of diabetics in India is expected to be 109 million cases by the year 2035 out of an estimated population of 1.5 billion.

Considering the prevalence of the disease in India and the projections, the wisdom lies in designing major interventions targeting that age group of population for which the projections are made. That would be the appropriate preventive action for the future health of the nation. This calls for creating awareness in the age group between 11 years to 16 years, i.e., the school children who will be in their vulnerable age group for diabetes in the year 2035. In this context, taking a scientific approach to study the level of understanding of the disease of diabetes among school children assumes significance. Research have demonstrated that children develop their causal beliefs about illness and health based on their

cognitive development (Natapoff, 1982; Williams & Binnie, 2002) and the accuracy of knowledge about disease causality has been found to increase and became differentiated with age (Sigelman, Maddock, Epstein, & Carpenter, 1993). According to Campbell (1975), as children move toward adulthood, their knowledge becomes enlarged, organized and continuously transformed.

A number of studies have been conducted on school students assessing their awareness of NCDs. In a study by Divakaran, Muttapillymyalil, Sreedharan, and Shalini (2010) school students of classes VI to X were assessed regarding the awareness of risk factors of NCDs (cancer, CVD's, diabetes). The findings revealed that majority of the students (84.8%) had a very low awareness about lifestyle risk factors of non-communicable diseases. And a dismally low percentage accounting to 0.8% had good knowledge about the lifestyle risk factors. It was revealed from a study that awareness of risk and preventive factors for NCDs was low among rural school children. Further knowledge levels of children from government schools regarding NCDs were found to be lower compared to those studying in private schools (Ade, Chethana, Mane, & Hiremath, 2014). These findings related to rural school children between the age group of 11 to 16 years. However, the study by Okoh and Jaja (2014) revealed an encouraging trends of progressive increase in knowledge across classes. The study also recorded the misconception that related to excessive consumption of sugar as antecedent of diabetes.

When it comes to measuring children's conceptualization of health and illness related aspects, researchers have used different methods such as draw-and-write technique (Piko & Bak, 2006) and vignette method (Myant & Williams, 2005). In addition to these

Correspondence should be sent to Meena Hariharan
Professor, Centre for Health Psychology, University of Hyderabad
Prof C. R. Rao Road, CUC, Gachibowli, P O Central University,
Hyderabad, Telangana
Email: meena.healthpsychology@gmail.com



Self -efficacy and Health Locus of Control in Primary Hypertensive Patients

Meera Padhy*, Neelima Krishnakumar**, Kavya Chelli*** & R. Lalnuntluangi****

Abstract

The objectives of the study were (1) to find out the role of duration of illness on self-efficacy and health locus of control (2) to explore the relationship between self-efficacy and health locus of control and (3) to assess the impact of self-efficacy on health locus of control of primary hypertensive patients. A between-subjects design was adopted and 150 individuals were grouped into three categories on the basis of duration of illness below one year, between one to five years and above five years and were administered the chronic disease self-efficacy and multi-dimensional health locus of control scales. Results revealed that the three groups differed significantly in internal and doctors health locus of control as well as in the level of self-efficacy. The internal health locus of control was found to have a significant positive correlation and doctors health locus of control was found to have a significant negative correlation with self-efficacy. Findings revealed the impact of self-efficacy on different dimensions of health locus of control. The implications of the study are discussed.

Key words: *Self-efficacy, health locus of control, primary hypertensive patients*

Hypertension (HTN), also known as high blood pressure is a non-communicable disease and is one of the leading causes of death and disability in India. According to the World Health Organization (2011) the prevalence of high blood pressure in Indians is 32.5 percent and by 2025, the rates of hypertension are estimated to rise to 22.9 % for men and 23.6% for women in India (Kearney, Whelton, Reynolds, Muntner, Whelton, & He, 2005). Pharmacotherapy and management of hypertension are the two major approaches to the treatment for most of the patients. Management of the condition can sometimes be challenging to the

*Assistant Professor (Corresponding author); Centre for Health Psychology, University of Hyderabad, Central University, Prof C.R. Rao Road; Gachibowli; P.O., Hyderabad 500046; Telangana; (India), Email ID: meerapadhyuh@gmail.com

**Freelance Psychologist (M. Sc Health Psychology), Bangalore, India; Email ID : neels408@gmail.com

&*Research Scholar (M. Sc Health Psychology); Centre for Health Psychology, University of Hyderabad, Prof C.R. Rao Road; Gachibowli; P.O., Hyderabad 500046; Telangana; (India), Email ID: kavayahcu@gmail.com; teteyralte@yahoo.in



Social Support and Adherence among Hypertensive Patients

Meera Padhy, R Lalnuntluangi, Kavya Chelli & Ruth Angiel Padiri

University of Hyderabad, Hyderabad, Telangana, India

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Abstract

Adherence to prescribed medical regimen plays a key role in sustaining health and well-being of individuals with hypertension. Among various factors social support seems to have a significant influence on adherence. With this background, this study was carried out with the following objectives- (1) to find out the role of gender in social support and adherence (2) to explore the relationship between social support and adherence and (3) to find out the effect of social support on adherence among hypertensive patients. Utilizing between subjects design, one hundred and fifty (75 men, 75 women) hypertensive patients were recruited from various hospitals in Mizoram, India and were administered the Interpersonal Support Evaluation List and Compliance Scale for hypertensive patients. Data were analysed using independent t test, Pearson r and simple regression. Independent t test indicated a significant gender difference in social support and adherence. A significant positive correlation was noticed between social support and adherence. Social support predicted a significant proportion of variance in adherence among hypertensive patients. The findings illuminate the role of social support in adherence to medical regimen. Psychosocial interventions to optimize social support in enhancing the adherence among patients with hypertension are of great importance in health care management.

Keywords: Social Support, Adherence, Hypertensive patients

JEL Classification: I1, I12

Paper Classification: Research Paper

Introduction

Hypertension or high blood pressure is a chronic condition that affects people all over the world. According to World Health Organization (WHO, 2013), over 140 million Indians were considered to have high blood pressure and the number is expected to cross 214 million mark in 2030. As per the World Health Organization 2008 estimates, the incidence of higher blood pressure in Indian men and women was 33.2% and 31.7% (WHO, 2011). According to the survey conducted by Integrated Disease Surveillance Project in 2007-08 on non-communicable disease risk factors, 19.6 % of hypertension cases were reported in north-eastern state of Mizoram, India (Ministry of Health and Family Welfare).

Leisure Motivation and Well-being among Adolescents and Young Adults

Meera Padhy¹ · Sheila Kumari Valli¹ · Ruopfuvinuo Pienyu¹ · Ruth Angiel Padiri¹  · Kavya Chelli¹

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Abstract Leisure activities give us the space, time and freedom to be ourselves. Research shows that these activities have a positive impact on life satisfaction and well-being. The objectives of the study were (a) to examine the differences in leisure motivation and well-being (b) to explore the relationship between leisure motivation and well-being (c) and to examine the effect of leisure motivation on well-being among adolescents and young adults. Utilizing between-subjects design, 100 adolescents (14–19 years) and 100 young adults (20–27 years) completed the Leisure Motivation and Well-being measures. Independent t-test revealed a significant difference between two groups on amotivation subscale and well-being score. The results indicate that when intrinsic motivation to know, to accomplish, to experience stimulation and extrinsic motivation - identified and introjected is high, well-being is also high. Leisure motivation explained significant proportion of variance in well-being for entire sample. The implications of the study are discussed.

Keywords Leisure Motivation · Well-being · Adolescents · Young adults

Introduction

Leisure activities give us the space, time and freedom to be ourselves. To engage in active leisure and sustain such activities over a period of time requires interest and motivation. Leisure motivation refers to the energy that initiates, directs and sustains the leisure involvement in the individual (Petri 1981). In the context of positive psychology, leisure activities should have a positive impact on life satisfaction (Seligman and Csikszentmihalyi 2000). This statement implies that leisure is meant to be an activity which will have an impact on life satisfaction of the individual. The activities are to be something that the individual likes to do on his/her own free will. This can be understood more clearly by the quote of Williams (1961) “the real dividing line between the things we call work and the things we call leisure is that in leisure, however active we may be, we make our own choices and our own decisions; we feel for the time being that our life is our own”.


According to the Self Determination theory (SDT), motivation can be understood along a continuum that represents a distinction in the degree to which one acts for internal or external reasons or rewards (Ryan and Deci 2000). The SDT continuum includes intrinsic motivation, extrinsic motivation and amotivation. Intrinsic motivation is the expression of the natural human tendencies of seeking to learn, to explore, to act autonomously, to connect with others, and to experience competence (Ryan and Deci 2000). Extrinsic motivation is where individuals simply aim to satisfy external demands to pressure or some kind of social reward. Individuals who have amotivation lack any intention to act and merely “go through the motions” rather mechanically.

Engagement in leisure activities seems to have a spill-over effect on general well-being (Edginton et al. 2006). Well-being is the state of successful performance throughout the life course integrating physical, cognitive, emotional and

✉ Meera Padhy
meerapadhy@yahoo.com

¹ Centre for Health Psychology, University of Hyderabad, Central University, Prof C.R. Rao Road Gachibowli P.O., Hyderabad, Telangana 500046, India

Optimism and Psychological Well-Being of Police Officers With Different Work Experiences

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Meera Padhy¹, Kavya Chelli¹, and Ruth Angiel Padiri¹

Abstract

This study examined the relationship between optimism and psychological well-being (PWB) among police officers. Sixty police officers, both male and female, between the age range of 26 to 57 years were categorized into two equal groups consisting of participants below 10 years of work experience (Group 1) and above 10 years of work experience (Group 2). They were administered the Psychological Well-Being Scale and Life Orientation Test. Results show that police officers of these two groups differed significantly on their optimism levels. Significant positive correlations were found between optimism and PWB, for Group 2 and the entire sample of police officers. The findings of this study indicate the need for organization-specific interventions to increase optimism to manage health outcomes, and improve the PWB of these officers.

Keywords

psychological well-being, optimism, police officers, work experience

Introduction

Psychological well-being and optimism have long been considered as central component of good life. Over the last few years, a significant body of research has been carried out on the effectiveness of optimism on well-being of the individual.

The psychological phenomenon of optimism can be understood in different ways. Optimism can be seen as a “disposition” or “attributional style.” Dispositional optimism is a generalized personality trait present across time and situations. It influences the individual to interpret past, present, and future events of life in a positive manner (Carver & Scheier, 2001; Carver, Scheier, & Segerstrom, 2010; Scheier & Carver, 1985). Studies carried out by Peterson and Seligman (1987) conceptualize optimism as an “attributional style,” where the individual possesses an inner strength (Seligman, 2002), that facilitates them to interpret their failures and negative events as inconstant (negative events will not occur again and can be overcome), external (negative events occurring due to temporary external factors or people), and that the event is specific (the event will not influence any other activity in one’s life).

Individuals with an optimistic explanatory style continue to pursue their valued goals and regulate themselves and their personal states using effective coping strategies even in the face of difficulties, so that they are able to achieve their goals (Sharot, 2011). In the research carried out regarding this perspective, positive correlations have been found between optimism and

physical/mental well-being, as individuals with an optimistic explanatory style are less likely to develop physical illness or depression or contemplate suicide (Miller, 2005) when they face major stressful life events than individuals with a pessimistic explanatory style (Giltay, Zitman, & Kromhout, 2006; Scheier, Carver, & Bridges, 2001; Seligman, 2002).

Positive well-being has two components: hedonic or *subjective well-being* (SWB), which focuses on happiness, positive affect, and pleasure, and eudemonic or *psychological well-being* (PWB), which focuses on fulfillment of human potential and realizing purpose in life (Keyes, Shmotkin, & Ryff, 2002; McGregor & Little, 1998; Ryan & Deci, 2001; Ryff, Singer, & Love, 2004; Waterman, Schwartz, & Conti, 2008). These two aspects of well-being are related yet distinct.

PWB is a state characterized by acceptance, actualization, contribution, coherence, and integration with others (Keyes & Ryff, 1995). Ryff (1989) conceptualized PWB as distinct from SWB and argued that there are six dimensions of PWB, namely, autonomy, personal growth, self-acceptance, life

¹University of Hyderabad, India

Corresponding Author:

Ruth Angiel Padiri, Centre for Health Psychology, University of Hyderabad, Central University P.O., Prof. C. R. Rao Road, Hyderabad 500046, India.

Email: ruthangiel@yahoo.com

