Prediction of Adherence through Illness Appraisal of Individuals with Diabetes: Role of Experiential Avoidance

Amna Fayyaz[1*], Shazia Yusuf[2]

Abstract

In chronic diseases, illness appraisal and adherence to the treatment go hand in hand. Diabetes is a silent killer, and most of the time, the experiential avoidance of the patient leads to drastic consequences. The present study was conducted to investigate the relationship between illness appraisal and adherence, and the mediating role of experiential avoidance in this relationship among individuals with diabetes. For this purpose, the data was collected from 150 individuals with Type-I diabetes ($n=71$) and Type-II diabetes ($n=79$), recruited from hospitals in Islamabad using a cross-sectional research design. To assess illness appraisal, Brief Illness Perception Questionnaire (Broadbent et al., 2015); for adherence, General Medication Adherence Scale (Naqvi et al., 2018) and for experiential avoidance, Brief Experiential Avoidance Questionnaire (Gámez et al., 2013) were administered. It was hypothesized that 1) there is a negative relationship between adherence, illness appraisal, and experiential avoidance among individuals with diabetes. 2) Illness appraisal predicts adherence among individuals with diabetes. 3) Experiential avoidance mediates the relationship between illness appraisal and adherence among individuals with diabetes. Results indicated a significant negative relationship between adherence, illness appraisal, and experiential avoidance among individuals with diabetes. Results also highlighted that illness appraisal significantly predicted adherence among individuals with diabetes. Furthermore, experiential avoidance significantly mediated the relationship between illness appraisal and adherence among individuals with diabetes. Study results have important implications in clinical settings to improve the treatment process and consider all the other factors impacting adherence.

Keywords: Adherence, Cross-sectional, Experiential Avoidance, Illness Appraisal, Individual with Diabetes

[1*]MS Scholar, Department of Psychology, Bahria University, Islamabad Campus, Pakistan.
[2]Assistant Professor, Department of Psychology, Bahria University, Islamabad Campus, Pakistan.

*Corresponding Author Email:
amna_khan47@outlook.com

Introduction

An ideal life seems to be having increased years to live in a better state and decreased percentage of years lived with disability. This means that people could live with approximate health for longer periods. On the contrary, certain conditions lead to decreased human longevity. Amongst these conditions are communicable and non-communicable diseases. These diseases account for a major death toll globally. As per the statistics provided by World Health Organization (WHO) (2018), over one-half of all deaths in the African region and about one-quarter in the Eastern Mediterranean and Southeast Asian region were caused by communicable diseases.

Similarly, non-communicable diseases led to 80-90% of deaths in European, American, and Western Pacific regions between 2000-2019. Globally, non-communicable diseases such as cancer, cardiovascular diseases, diabetes, and chronic respiratory diseases are found to be responsible for 74% death toll (WHO, 2022). Premature death or mortality is not

the only consequence, but these conditions also lead to significant morbidity, economic burden, and psychological turmoil in low-middle income countries specifically.

Diabetes has emerged as a chronic health issue of the 21st century and exposed the person with the illness to significant complications in terms of psychological load and catastrophic healthcare costs. It is a metabolic disorder that encompasses either insufficient insulin production or ineffective use of insulin and is comprised of 2 major types, Type-I diabetes also known as juvenile-onset diabetes, and Type-II diabetes or adult-onset diabetes (American Diabetes Association, 2015; WHO, 2018). Statistics from WHO (2022) depicted that diabetes prevalence has increased rapidly in low-middle-income countries from 2000-2022, requiring lifestyle modification, increased investment, and strengthened action to prevent or control the disease (Zawudie et al., 2022). Diabetes exposes people to both physical and psychological complications, certainly affecting their quality of life, so severe daily life modifications are required on the part of the patient (Palamenghi et al., 2020).

Non-communicable diseases like diabetes are mostly framed as lifestyle diseases, which means putting responsibility on the individual or his lifestyle (Manderson & Jewett, 2023). Lifestyle choices are dominant contributing factors in predisposing and perpetuating any illness. The focus on the lifestyle depicts that a person has the free will and capacity to avoid significant risk factors by changing his routines and making health decisions about their diet intake, physical work, and compliance with the recommended guidelines (Manderson & Jewett, 2023). Possibly at some point, lifestyle choices are significantly affected either by person-related or environmental-related factors. One of those crucial factors is the perception or appraisal of illness. The appraisal involves the evaluation of the illness course, illness outcome, emotions and actions related to the illness as well as the prognosis (Broadbent et al., 2015).

It is suggested that individuals with any illness devise their illness outcomes based on their thoughts, emotions, and experiences. These factors enable him to accept the presence and occurrence of his illness or deny it (Petrie et al., 2003). This evaluation is known as illness appraisal. Illness appraisal refers to a person's implicit views about his illness and significantly impacts the future health and well-being of an individual. Illness appraisal gives a picture of how an individual assesses his illness, emotionally responds to it, and adapts to it, which defines an individual's coping mechanism (Moskowitz et al., 2013). According to Leventhal's common-sense model of illness (1997), the organization of emotional and cognitive elements regarding any illness aims to help an individual in the apprehension, management, and dealing with any health threat. further suggests that illness appraisal is significantly related to health-related behaviors and health outcomes. An individual makes a strategy based on which can be either positive or negative (Petrie et al., 2003). Showing compliance with or adhering to the treatment guidelines is also a part of health strategy which is mainly impacted by the information individual has about his illness.

Adherence or compliance is defined as the extent to which a person follows the agreed prescription or recommendation of his physician. In diabetes, showing compliance is one of the most demanding tasks and it is suggested that nonadherence rates in diabetes range from 36%-93% (Cani et al., 2015). As in diabetes, an individual must perform complex activities ranging from low sugar intake to higher physical activity (Nyenwe et al., 2011). The recommendations vary according to the type of diabetes diagnosed and showing compliance to these recommendations can lower the risk of future complications. Alongside the thought of being adherent to the treatment guidelines, there is a continuous psychological burden that the person is suffering. Consequently, his coping significantly gets impacted by that

mental turmoil either consciously or subconsciously (Pearce et al., 2013). Individuals with diabetes are explicitly stress-prone when initially diagnosed with chronic conditions and at a young age (Carls et al., 2012). The psychological crisis might also be evident because of the chemical changes in the body due to the illness. Individuals sometimes get engaged in negative coping strategies to deal with that stress or anxiety. One of those strategies is known as experiential avoidance. It is the process of avoiding or refusing to stay in contact with the thoughts, emotions, or behaviors that elicit stress or anxiety (Hayes et al., 1996). It means that individuals experience denial, rejection, and non-adherence to cope with the stressful thoughts and emotions brought by their illness course. In this regard, the present study aimed to determine the relationship between different factors impacting the compliance behaviors of individuals with diabetes. Previously, the relationship between illness appraisal and adherence has been studied but the role of experiential avoidance has not been studied yet. The current study is an attempt to identify the significance of relationships as well as to identify in what way illness appraisal and experiential avoidance can influence the occurrence of adherence among individuals with diabetes. In this regard, following of the hypotheses were generated:

Hypotheses
1. There is a negative relationship between illness appraisal, adherence, and experiential avoidance among individuals with diabetes.
2. Illness appraisal predicts adherence among individuals with diabetes.
3. Experiential avoidance mediates the relationship between illness appraisal and adherence among individuals with diabetes.

Method
Sample
G-power 3.1.9.7 was used to calculate the study sample. The sample of the study comprised of individuals with diabetes (N=150) with an age range of 15 to 89 years ($M = 45.07$, $SD = 16.52$) divided into Type-I diabetes (n=71) and Type-II diabetes (n=79). Participants were voluntarily recruited from the hospitals and clinics located in Islamabad by using the purposive sampling technique. Inclusion criteria for the sample consisted of individuals diagnosed with Type-I and Type-II diabetes, taking allopathic medication only rather than herbal or self-medication. Exclusion criteria include those who are diagnosed with any other disease along with diabetes, diagnosed with any psychological disorder or are unable to understand Urdu language.

Measures
The following measures were used to assess the variables.

Demographic Datasheet
The demographic datasheet included questions about age, gender, qualification, family system, marital status, residence, diagnosed type of diabetes, and type of treatment.

Brief Illness Perception Questionnaire (Broadbent et al., 2015)
It was a self-report questionnaire developed to explore different aspects of illness perception. The scale comprised 9 items, among which the initial 8 items were based on an 11-point Likert type scale (0-10) while the last item was an open-ended question. The initial eight items were divided to assess cognitive and emotional aspects of illness perception. (Broadbent et al., 2015).

The last item explored an individual's beliefs about the most significant cause of his illness and ranked them order-wise. The last item was analyzed using the 7 categories provided by Lukoševičiūtė et al. (2020). The brief illness perception questionnaire showed good test-retest reliability ranging from 0.48 to 0.70. Furthermore, it also depicted adequate concurrent validity ranging from 0.33 to 0.63 with a significant correlation (Broadbent et al., 2015). The scale was translated into the Urdu language by using a standardized procedure of back translation in the present research, and

psychometric properties were assessed, for which the reliability score of the scale was $\alpha= 0.56$

General Medication Adherence Scale (Naqvi et al., 2018)

It was a self-report scale that comprised 11 items based on a 4-point Likert scale ranging from "always" to "never ever". The scale was translated into different languages while initially developed in the Urdu language. The scale measures individuals' adherence to medications for chronic disease. The Cronbach alpha reliability of the scale was 0.84, the Pearson correlation of the scale was 0.99** (p <0.01), and the content validity was 0.8 (SD=0.14) (Naqvi et al., 2018). Urdu version of the scale was used in the study with the given license number and scale appropriateness was assessed, for which the Cronbach alpha was 0.92.

Brief Experiential Avoidance Questionnaire (Gámez et al., 2013)

It was a self-report 15 items scale developed to assess experiential avoidance in four dimensions: explicit behavioral avoidance, attitude regarding distress, implicit avoidance, and ability to respond to distress. The scale was based on a 6-point Likert scale ranging from "strongly disagree to strongly agree" in which item 6 was reverse scored strongly. The reported Cronbach alpha reliability of the scale ranged from 0.80-0.89 and showed adequate validity (Gámez et al., 2013). The scale was translated into the Urdu language by using the standardized procedure, and the alpha reliability score of the scale in the present study was $\alpha= 0.92$

Procedure

After getting permission from hospitals and clinics' administration, individuals with diabetes were approached. The participants were briefed about the purpose of the study. They were ensured that information taken from them would only be used for research and would be kept confidential. Participants were asked to sign the informed consent if they were willing to participate in the study. The average time taken by a single research participant was 12-15 minutes. In the end, they were acknowledged for their participation and cooperation.

Ethical Considerations

The research proposal was analyzed and approved by the Departmental Ethical Committee before further proceedings. Permission from the authors of the instruments used in the study was taken. All the ethical guidelines were followed, inclusive of confidentiality and anonymity maintenance. The sample was included voluntarily, and they were informed that they could withdraw at any time.

Results

Descriptive statistics were carried out to determine the demographic variables of the study sample (Table 1). Furthermore, Pearson correlation was done to find out the nature of relationship between study variables. Likewise, regression analysis and mediation analysis were done to find out the influence of illness appraisal on adherence and to analyze the role of experiential avoidance in the relationship between illness appraisal and adherence among individuals with diabetes. The age range of the study participants was 15 to 89 years (M=45.07, SD=16.52). The sample was predominantly represented by male participants, i.e., 80 males and 70 females. Individuals with the diagnosed type of diabetes (Type-I and Type-II) and other demographic characteristics are depicted in Table 1.

Table 1 *Demographics of the Study Sample* (*N*=150)

Variables		*n*	*%*	*M*	*SD*
Age				45.07	16.52
Gender	Male	80	53.3		
	Female	70	46.7		
Qualification	Illiterate	7	4.7		
	Elementary	36	24		
	Secondary	29	19.3		
	Higher Secondary	20	12.7		
	Undergraduate	44	30		
	Post-Graduate	14	9.3		
Family system	Joint	67	44.7		
	Neutral	83	55.3		
Marital status	Married	104	69.3		
	Unmarried	31	20.7		
	Widowed	14	9.3		
	Divorced	1	0.7		
Residence	Rural	48	32		
	Urban	102	68		
Diagnosed type of diabetes	Type-I	71	47.3		
	Type-II	79	52.7		
Type of treatment	Insulin-dependent	79	52.67		
	Non-insulin-dependent	71	47.33		

Table 2

Descriptive Statistics and Inter-scale Correlation of the Study Variables among Individuals with Diabetes (*N*=150)

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
BIPQ	47.77	9.72	-									
GMAS	24.01	7.28	-.39**	-								
PBNA	10.40	3.56	-.33**	.94**	-							
ADPB	8.97	2.68	-.37**	.92**	.77**	-						
CRNA	4.64	1.67	-.39**	.87**	.73**	.77**	-					
BEAQ	58.28	13.74	.59**	-.54**	-.48**	-.49**	-.55**	-				
EBA	32.85	6.78	.48**	-.45**	-.40**	-.40**	-.47**	.95**	-			
ARD	15.87	4.78	.57**	-.47**	-.43**	-.42**	-.48**	.93**	.81**	-		
IA	6.05	2.49	.53**	-.54**	-.49**	-.52**	-.48**	.82**	.68**	.72**	-	
ARTD	3.51	1.64	.50**	-.49**	-.40**	-.47**	-.53**	.52**	.38**	.40**	.40**	-

**p<0.01

Note. BIPQ=Brief Illness Perception Questionnaire, GMAS=General Medication Adherence Scale, PBNA=Patient Behavior Related Non-Adherence, ADPB=Additional Disease and Pill Burden, CRNA=Cost Related Non-Adherence, BEAQ=Brief Experiential Avoidance Questionnaire, EBA= Explicit Behavioral Avoidance, ARD=Attitude Regarding Distress, IA=Implicit Avoidance, ARTD=Ability to Respond to Distress

Inter-scale correlations were done and are reported in Table 2. A significant negative correlation was found between illness appraisal, adherence, and experiential avoidance, whereas a significant positive correlation was found between illness appraisal and experiential avoidance among individuals with diabetes.

Table 3

Regression Coefficient of Illness Appraisal and Adherence among Individuals with Diabetes (*N*=150)

					95% CI	
Predictor	***B***	***SEB***	**β**	***p***	**LL**	**UL**
Constant	37.79	2.77		.000	32.32	43.26
Illness appraisal	-.29	.06	-.39	.000	-.40	-.18

R=.39 R^2=.15 ΔR^2=.14 (*F*=25.77 *p*=.000)

Furthermore, regression analysis was done to analyze the influence of illness appraisal on adherence. The results indicated that illness appraisal significantly negatively predicted adherence among individuals with diabetes. It means that people holding negative or false perceptions about their illness course and illness outcome were more prone to show a lack of compliance to the treatment recommendations. Likewise, the model is fit.

Table 4

Predictors of Adherence using Experiential Avoidance as Mediator (*N*=150)

Model	Coefficients	*SE*	*p*	95% CI	
				LL	*UL*
Path a					
IA → EA	.83	.09	.0000	.65	1.02
Path b					
EA → MA	-.26	.05	.0000	-.35	-.17
Path c					
IA → MA (Total effect)	-.29	.06	.0000	-.40	-.18
Path c'					
IA → MA (Direct effect)	-.07	.06	.25	-.19	.05
IA → MA (Indirect effect)	-.21	.05	.0000	-.32	-.13

Note: IA=Illness appraisal, EA=Experiential avoidance, MA= Medication adherence

Table 4 depicting the result of mediation analysis, showed that the path (direct effect) from illness appraisal to experiential avoidance was positive and statistically significant (β=.83, SE=.09, p<.001). The path (direct effect) from experiential avoidance to adherence was negative and statistically significant (β=-.26, SE=.045 p<.001). Further, the path (total effect) from illness appraisal to adherence was negative and statistically significant (β=-.29, SE=.06, p<.001). The direct effect of illness appraisal on adherence after adding a mediator was negative but non-significant (β=-.07, *SE*=.06, *p*=.25), which indicated that experiential avoidance fully mediated the relationship between illness appraisal and adherence among individuals with diabetes. Furthermore, Z score for Sobel test was (z=-4.77).

Figure 1
Predictive Model of Experiential Avoidance to Illness Appraisal and Adherence
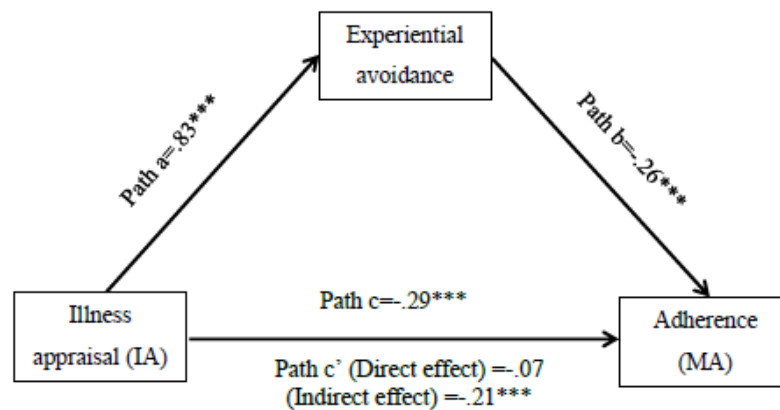
Discussion

The study aimed to examine the role of experiential avoidance in the relationship between illness appraisal and adherence among individuals with diabetes. The general medication adherence scale and brief experiential avoidance questionnaire accompanied sound alpha reliability scores. The present study results indicated a significant negative relationship between illness appraisal, adherence, and experiential avoidance among individuals with diabetes. Literature highlights that the individuals diagnosed with diabetes who held false or negative beliefs about their illness were less compliant with their treatment recommendations, including their diet, medications, and physical activities (Alzubaidi et al., 2015). Interventions to change an individual's illness beliefs have been shown to improve treatment outcomes and self-care behaviors of individuals living with chronic illness (McAndrew et al., 2008). Leventhal and colleagues (1997) model of common-sense self-regulation also states that an individual's perception of illness and the treatment regime impacts his adherence towards treatment. An individual's belief about illness treatment impacts not only his compliance but also his responsiveness and coping strategies (Leventhal et al., 1997).

The present study results revealed a significant positive relationship between illness appraisal and experiential avoidance. It has been suggested that more negative illness representations are related

to increased psychopathology like emotional distress and depression (Skinner et al., 2014). Psychopathology occurs in response to the appraisal of illness, as it has been reported that inadequate illness beliefs negatively impact adherence leading to maladaptive coping strategies which induce psychological issues. A study on individuals with cardiac issues indicated that individuals with inadequate illness beliefs faced psychological distress (due to their maladaptive coping), which caused impaired adherent attitude, further leading to complications (Fajrin-Sudana et al., 2019).

Present study results reported that illness appraisal was also negatively influencing adherence among individuals with diabetes, which meant that when an individual has harmful or inaccurate perception of his illness, he is less likely to engage in compliant behaviors. It has been suggested that individuals with diabetes adhere to their treatment recommendations more adequately if they believe they have accurate knowledge about it and believe in medication effectiveness and consider their illness as manageable (Kugbey et al., 2017). Satisfaction, convenience, and treatment guidelines' effectiveness were strongly related to good medication adherence in individuals with dyslipidemia (Haddad et al., 2018). Illness misconceptions and faulty practices also contributed to mediation nonadherence (Kumar et al., 2017).

Mediation analysis explored the mediating role of experiential avoidance in the relationship between illness appraisal and adherence. Mediation analysis indicated that experiential avoidance acted as a mediator in the relationship between illness appraisal and adherence among individuals with diabetes. The results showed that illness appraisal positively affected experiential avoidance, and experiential avoidance was significantly negatively affecting adherence. When experiential avoidance was introduced as a mediator, the direct effect of illness appraisal on adherence was non-significant, but the indirect effect was significant, which indicated that experiential avoidance was fully mediating the relationship between illness appraisal and adherence among individuals with diabetes. Results showed that when an individual had negative, inaccurate, or threatening illness perception, he complied less with the treatment regime and then, for short-term relief, came up with unhealthy coping strategies to deal with the uncertainty and distress like experiential avoidance, which further limited him to adhere to treatment regime.

According to the common-sense self-regulation model of Leventhal et al. (1992), illness perception is an essential factor that impacts illness or treatment outcome. The model believes that from the beginning of illness to treatment outcome, coping mechanisms play an important role. Among these coping mechanisms health models differentiate two types of mechanisms: avoidant coping and vigilant coping (Carver, 1997; Leventhal et al., 1992). Avoidant coping includes blunting emotions, venting emotions, thought suppression, denial, self-blame, guilt, and vigilant coping includes planning, acceptance, adaptation, and understanding. Literature suggested that vigilant coping was linked with effective and favorable outcomes, whereas avoidant coping was linked with poor health outcomes. These coping strategies were also found to be impacted by the meaning assigned to any health threat that makes illness and treatment perception (Brandes & Mullan, 2014).

Perception not only involves prescribing any general meaning to a health threat, but it also involves specific cognitive and emotional processes that enable the person to determine the future outcomes that directly impact attitude towards the treatment regime. Mishel's model of uncertainty in illness (1998) also reported that when a stressor is introduced, after generating the antecedent of uncertainty, the uncertainty is appraised, a cognitive process aligned to identify the characteristics of the stressor that whether it is a threat or a challenge. Based on that appraisal, coping resources are identified to deal with the stressor (Franks & Roesch, 2006; Mishel, 1998). Literature has reported that coping mechanisms mediate the relationship between illness perception, health outcomes such as better compliance to treatment, and emotional outcomes, and with that, illness perception and health outcome also have a direct link between them (Berry et al., 2015; Rajpura & Nayak, 2014). It has been found that avoidance behaviors (self-blame, rumination, denial, guilt, suppression) were found common among individuals with COVID-19, which obstructed their adherent behaviors, that their emotional reactions to the pandemic circumstances interfered with their cognitive capacities and created a barrier to their adherence (Chong et al., 2020).

It is suggested to consider the illness perception of individuals living with diabetes and provide adequate support to alter the outcomes of the illness regime to make them more adherent (Schur et al., 1999). Being diagnosed with Type-I diabetes becomes an extensive and challenging phase of an individual's life. The individuals make sense of their conditions, understand them, and develop coping strategies that further impact their treatment or management choices (Jonker et al., 2018). Adequate coping strategies bring positive outcomes, but if these are inadequate, like avoidance, denial, and defensiveness further lead to psychological burden (Datye et al., 2015). Living with

diabetes is a hectic task, and individuals are required to abide by certain health guidelines, but under certain circumstances, the health behaviors get compromised, which was highlighted by the current study.

Implications of the Study

The relevance of identifying the beliefs of individuals with their illnesses was significant that it highlighted the role of the physician. It highlighted why it is necessary to provide easy and accurate information to the patient and discuss his illness to get an outlook on his view of illness. Regarding the role of experiential avoidance in illness perception and adherence, the study findings convinced the idea of utilizing psychological intervention based on coping, emotion regulation, and acceptance of illness. Besides, it suggested undertaking a tailored approach and following holistic guidelines when developing treatment plans to focus on individual characteristics and monitor psychological and social factors that can contribute to treatment adherence. Furthermore, the results pressurized to extend patient care to interdisciplinary coordination where health care providers, endocrinologists, nurses, psychologists, and dietitians can work collaboratively to address various aspects of treatment adherence

Limitations of the Study

The present study used a cross-sectional approach to gather the data at a single point in time. Secondly, the finding could not be generalized to the whole population with diabetes as the present study focused on specific demographic characteristics and cultural backgrounds. It also did not incorporate females with gestational diabetes. The data was collected from a limited area, so it cannot be fully generalized to the diabetic population.

Recommendations

To get an in-depth idea it is recommended to conduct longitudinal studies in the future. Secondly, it is suggested to incorporate other types of diabetes and includes children and adolescents with Type-I diabetes as this age group may be more prone to develop false perceptions about their illnesses. In the present study,

self-report measures were administered. In conclusion, it is suggested to take a qualitative approach, and data should be collected from vast and different areas to get different trends as well.

Conclusion

The study concluded a significant role of experiential avoidance and an impact of illness appraisal in the adherent behavior of individuals with diabetes. Furthermore, it also highlighted the impact of different demographics that can also serve as a contributing factor in the course of illness.

Contribution of Authors

Amna Fayyaz: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft
Shazia Yusuf:, Methodology, Writing - Reviewing & Editing, Supervision

Conflict of Interest

There is no conflict of interest declared by authors.

Disclaimer

The current study has been presented in the International Brain and Biomedicine Conference IBBC-23 held on 18th-19th May 2023 at Government College University, Faisalabad, Pakistan.

Data Availability Statement

The datasets of the current study are not available publicly due to ethical reasons but are available from the corresponding author [F.Y.] upon the reasonable request.

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