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Fatalism, Diabetes Management Outcomes, and the Role of Religiosity

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Author Biography

Vincent Berardi has an M.S. in Applied Mathematics from San Diego State University and is a student in the Computational Sciences Joint Ph.D. program offered by San Diego State University and Claremont Graduate University. Mr. Berardi's research, performed at the Center for Behavioral Epidemiology and Community Health, is at the nexus of real-time, mobile technology and health interventions, focusing on the incorporation of behavioral principles and dynamical systems analyses into these processes. He currently works on Project Fresh Air, an NIH-funded trial to reduce children's second-hand smoke exposure.

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Conflict of Interest

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**Fatalism, Diabetes Management Outcomes,
and the Role of Religiosity**

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4 **Abstract**
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6 This study aimed to determine if fatalistic beliefs were associated with elevated levels of
7 glycated hemoglobin (HbA1c) and to establish the role of religiosity in this relationship. A
8 cross-sectional survey was conducted on a sample of 183 Jewish adults with diabetes visiting a
9 large medical center in northern Israel. Self-administered questionnaires assessed level of
10 religiosity, fatalistic beliefs, diabetes management behaviors, and demographic/personal
11 characteristics; lab tests were used to measure HbA1c. Multivariate regression indicated that
12 fatalism was significantly associated with HbA1c ($\beta = 0.51, p = 0.01$). The association was no
13 longer statistically significantly after including self-reported religiosity in the model ($\beta = 0.31, p$
14 $= 0.13$). This phenomenon is likely due to a confounding relationship between the
15 religious/spiritual coping component of the fatalism index and self-reported religiosity ($r = 0.69$).
16 The results indicate that addressing fatalistic attitudes may be a viable strategy for improving
17 diabetes management, but call for a better understanding of the interplay between religiosity and
18 fatalism in this context.
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39 **Keywords:** diabetes, fatalism, religiosity, HbA1c
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4 **Introduction**
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8 The worldwide prevalence of diabetes mellitus among adults aged 20-79 years is projected to
9 rise from 6.4% in 2010 to 7.7% in 2030 (Shaw et al. 2010). Due to the association between
10 diabetes and multiple comorbid conditions (Blackburn et al. 2013), this increase poses a
11 significant threat to global public health. Between 2007 and 2009, the prevalence of adults (≥ 21
12 years) in Israel with diabetes ranged from 7.6% to 8.5% (Israel Center for Disease Control 2011)
13 and the costs associated with diabetes represented 3.5% of total healthcare expenditures in 2006
14 (Chodick et al. 2010). Critical components in improving diabetes-related outcomes are
15 adherence to diabetes medication and self-care protocols (Funnell et al. 2012); previous studies
16 have shown that these activities are associated with fatalistic beliefs (Walker & Smalls 2012).
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30 Fatalism is generally described as the tendency to believe that events are predetermined or
31 determined by external events (Abraído-Lanza & Viladrich 2007; Flórez et al. 2009; Powe and
32 Johnson 1995; Shen et al. 2009). Several studies have identified a religious component of
33 fatalism (Flórez et al. 2009; Franklin & Schlundt 2007), including Acevedo (2008) who defines
34 fatalism as a two-dimensional concept comprised of powerlessness and the relinquishing of
35 control to a central theological authority. In opposition to these constructs, fatalism can be
36 conceptualized as a functional response to stress and uncertainty (Keeley et al. 2009). For
37 example, commercial sex workers confronting elevated HIV risks (Varga 2001) and individuals
38 related to victims of terrorist attacks (Yeh et al. 2006) were found to report fatalism as a coping
39 mechanism.
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56 Despite variability in the definition of fatalism, there is considerable evidence of its association
57 with diabetes (Egede & Bonadonna 2003; Hampson 1997; Lange & Piette 2006; Trento et al.
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4 2008; Walker & Smalls 2012); however the functional nature of this relationship is not yet
5
6 known. There is some indication that this interrelation is mediated by diabetes self-management
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8 (Egede & Bonadonna 2003; Osborn, Bains, & Egede 2010; Walker & Smalls 2012). Fatalistic
9
10 attitudes are also associated with a decrease in healthy behaviors known to improve diabetes
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12 outcomes (i.e., exercise, non-smoking, and eating healthy foods such as fruit) (Franklin &
13
14 Schlundt 2007; Niederdeppe & Levy 2007). To better understand the role of fatalistic beliefs in
15
16 diabetes care, Egede and Ellis (2010) developed the diabetes fatalism scale (DFS) which
17
18 consisted of three psychometrically identified subscales: religious/spiritual coping, perceived
19
20 self-efficacy, and emotional distress. The DFS scores significantly correlated with elevated
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22 glycated hemoglobin (HbA1c) levels, diet, exercise, blood sugar testing and other diabetes self-
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24 care, and decreased quality of life (Egede & Ellis 2010; Walker & Smalls 2012).
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32 Personal mastery is a construct that overlaps with fatalism, powerlessness, and self-efficacy
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34 (Christie-Mizell & Erickson 2007) and has been found to be associated with diabetes and
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36 diabetes management. It is defined as the extent to which people see themselves as being in
37
38 control of the forces that affect their lives (Pearlin & Menaghan 1981). Higher levels of
39
40 personal mastery have been associated with better diabetes self-management (Skaff et al. 2003)
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42 and personal mastery has been shown to mediate the relationship between diabetes and disease-
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44 related depression (Bailey 1996) .
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50 The fatalism metric used in this study combined the religious/spiritual coping and perceived self-
51
52 efficacy subscales of the DFS with Pearlin's personal mastery scale. These concepts can be
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54 framed within the theory of locus of control, which posits that individuals' behaviors and
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56 attitudes in various contexts occur within a continuum of beliefs ranging from internal to external
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4 control (J. Rotter 1966). Strong perceptions of perceived self-efficacy and personal mastery are
5 associated with an internal locus of control and are characterized by the belief that personal
6 behaviors affect life's circumstances. Conversely, feelings of religious/spiritual coping are
7 associated with an external locus of control or the attribution of affairs to outward elements (i.e.,
8 religious factors). Fatalism and locus of control are sometimes used synonymously with greater
9 fatalistic attitudes being associated with an external locus of control, although it has also been
10 suggested that fatalism is a narrower definition than locus of control (Foxman et al.1990).Several
11 studies have demonstrated a relationship between locus of control and diabetes (Knappe &
12 Pinquart 2009; Trento et al. 2014). For instance, patients with type 2 diabetes reported higher
13 internal locus of control, or less fatalism, compared to type 1 diabetics (Trento et al. 2008).
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29 Previous studies have demonstrated an association between religiosity and diabetes outcomes.
30 For instance, focus groups conducted with African-American, diabetic women have identified
31 religiosity as a significant factor in coping and emotional support (Samuel-Hodge & Headen
32 2000) and religiosity has been shown to be negatively-correlated with depression in low-income
33 individuals with diabetes (Kilbourne et al. 2009). In addition to its association with diabetes,
34 relationships have also been identified between religiosity and fatalism (Jacobson 1999),
35 religiosity and mastery (Schieman et al. 2003), and religiosity and locus of control (Fiori et al.
36 2006).
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50 Due to religiosity's correlation with diabetes, locus of control, fatalism, and personal mastery,
51 there is the potential for it to affect the relationship among these variables. Therefore, this study
52 aimed to determine if fatalism, conceptualized as consisting of the religious/spiritual coping and
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4 self-efficacy components of the DFS along with personal mastery, was associated with elevated
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6 levels of HbA1c and to determine the effect of self-reported religiosity on this relationship.
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9 **Methods**

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12 A cross-sectional survey was conducted in northern Israel during 2012 and 2013 within a
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14 diabetes clinic in a large medical center managed by Clalit Healthcare Services. The study was
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16 approved by their Ethical Review Board. Self-administered questionnaires were distributed to
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18 every other patient with type 2 diabetes on the list of appointments for the day. Patients were
19
20 asked by the doctor, nurse, or researcher to participate in the study. If they agreed, a
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22 questionnaire was given to them to complete while waiting for their appointment. A researcher
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24 or nurse was available to assist with the questionnaire if needed.
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29 Sample

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32 All participants had been referred to the clinic by their primary physician. Eligible patients were
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34 over 18 years of age with diagnosed type 2 diabetes for at least one year and were being treated
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36 with oral diabetes medication or insulin. A total of 183 Jewish Israeli individuals completed the
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38 survey. The response rate was 85% and 28% of the non-responders were called into the doctor
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40 prior to finishing the questionnaire and would not continue afterwards. Only complete
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42 questionnaires were analyzed.
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46 Questionnaire

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49 The questionnaire included questions about medication use, length of time with diabetes, self-
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51 reported health, levels of success of diabetes treatment, management of diabetes care, health
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53 behaviors, levels of fatalistic beliefs and socioeconomic measures. The questionnaire was pre-
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55 tested with 10 patients and no problems were detected.
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59 The questionnaire is included in Appendix 1.

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4 Study variables
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8 **HbA1c:** The level of HbA1c for each participant was extracted from the patient's computerized
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10 clinical file and was measured in National Glycohemoglobin Standardization Program (NGSP)
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12 units. Once this was obtained, all information pertaining to the identification of the patient was
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14 deleted.
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18 **Demographic variables:** Age, gender, and country of birth were self-reported.
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22 **Self-Reported Religiosity:** Patients were asked to select their level of religiosity from a list with
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24 three ordinal options: secular, traditional or religious.
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27 **Education:** Assessed by reported number of years of education and recoded as an ordinal scale:
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29 less than 12 years, 12 years of schooling, and greater than 12 years.
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33 **Employment:** Assessed by an ordinal scale: worked full time, part time, or not at all. The
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35 variable was coded as dichotomous: employed or not employed.
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39 **Income:** Measured by an ordinal scale of household family income: above the mean, mean or
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41 below the mean for Israel (8,500NIS/\$26,000 USD in 2011).
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45 **Marital status:** Patients were asked if they were married, lived with a partner, single, divorced,
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47 or widowed. This was recoded into two groups: living with a partner or single.
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51 **Medication:** Medication use was measured as a dichotomous variable - those taking insulin and
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53 those taking only medication with no insulin.
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56 **Duration of diabetes:** As reported by patients in years.
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4 **Number of children:** As reported by patients.
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7 **Diabetes Fatalism Index:** The diabetes fatalism index consisted of the religious/spiritual coping
8 and perceived self-efficacy components of the DFS (Egede & Ellis 2010) along with all but one
9 item in Pearlman’s personal mastery instrument (Pearlin & Menaghan 1981). The personal
10 mastery component was included to provide a broad measure of control. The emotional distress
11 element of the DFS was not measured because it does not fit our study’s definition of fatalism,
12 which is based on Acevedo’s (2008) characterization. Two items measuring the degree to which
13 participants thought “Disease is God’s way to punish man” and “Man has responsibility for his
14 health,” were also included. Culture-specific modifications such as these are recommended to
15 increase the validity of a scale (Beaton et al. 2000; Vreeman et al. 2013). All items ranged from
16 1 to 5 and were coded so that higher values indicated stronger fatalistic beliefs.
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33 An exploratory factor analysis employing the principle-component estimation method with
34 orthogonal Varimax rotation was used to characterize the underlying structure of the fatalism
35 items. Factors on which three or more items loaded > 0.4 were considered for subsequent
36 analyses. Three factors, each corresponding to a component from which the fatalism index was
37 built, emerged: *religious/spirituality coping* (4 items; $\alpha = .88$, eigenvalue $[\lambda] = 3.52$), *personal*
38 *mastery* (5 items; $\alpha = .77$, $\lambda = 3.03$), and *perceived self-efficacy* (6 items; $\alpha = .65$, $\lambda = 2.41$). One
39 item did not meet the inclusion criteria for any of the scales and was excluded from further
40 analyses. A fatalism index score for each patient was computed by summing responses to the 15
41 remaining fatalism items and dividing by the number of completed responses; the variables used
42 to form the scale demonstrated acceptable internally consistency (15 items; $\alpha = .75$). Similar
43 computations were used to create individual variables for each of the three subscales.
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4 **Self-management of diabetes:** Patients were asked how often they measure their glucose, take
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6 their treatment (insulin or medication), check their feet, and visit their doctor and dietician. The
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8 ordinal scale ranged from 1 (never) to 5 (always).
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11 **Lifestyle management-** Patients were asked to what extent they eat according to
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13 recommendations, eat at least 5 fruit or vegetables a day, eat foods with more than 5% fat
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15 content, perform physical activity, and smoke tobacco. The answers ranged from 1 (never) to 5
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17 (always).
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22 Statistical Methods

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24 Means of fatalism and its subscales were contrasted among patients grouped according to
25
26 demographic and diabetes-related characteristics using one-way analysis of variance (ANOVA).
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28 For comparison, continuous (e.g., age) and count (e.g., number of children) variables were split
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30 into two groups using their respective mean values.
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36 Using ordinary linear regression models, we regressed HbA1c on the fatalism index, self-
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38 reported religiosity, and the demographic and diabetes-related characteristics. To arrive at a
39
40 multivariable model that best explained HbA1c variance, a backwards stepwise regression
41
42 procedure was used (Hosmer et al. 2013). First, a model was created that included all covariates.
43
44 Covariates were then removed from the multivariable model one at a time beginning with the
45
46 covariate that had the largest non-significant p-value from simple linear regression analyses.
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48 This procedure continued until all remaining variables were statistically significant at an alpha
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50 level of 0.05. Covariates previously removed were reentered into the full multivariable model
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52 one-by-one to examine whether they confounded the relationship between the fatalism index and
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54 HbA1c. Covariates were considered confounders if their inclusion resulted in a greater-than
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4 10% change in the estimated beta coefficient of the fatalism index. Diabetes-management and
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6 lifestyle-management items were not entered into the regression models since there was not
7
8 sufficient variability in participant responses to yield meaningful conclusions. Furthermore, their
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10 inclusion reduced the statistical power of the analysis.
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15 Pearson correlations were subsequently used to examine the relationship among the composite
16
17 fatalism index, its subscales, and religiosity.
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20 **Results**

21
22 Table 1 presents the demographic characteristics of the sample. The mean age was 65.7
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24 (Standard Deviation [*SD*] = 9.2) and the mean education level was 12.9 years (*SD* = 3.0).
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26 Patients lived with diabetes for an average of 14.4 years (*SD* = 8.4) and the mean HbA1c was
27
28 8.4% (*SD* = 1.6).
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33 Group means of the three fatalism sub-scales and the fatalism index are presented in Table 2.
34
35 Differential levels of self-reported religiosity were significantly associated with a difference in
36
37 the fatalism index whereby secular individuals were less fatalistic than traditional individuals
38
39 who were, in turn, less fatalistic than religious individuals. A similar trend was identified for the
40
41 relationship between religiosity and the religious/spiritual coping subscale of the fatalism index,
42
43 but not for the other two subscales. Significant between-group differences in the mean fatalism
44
45 index values were also identified for 4 of the remaining 10 variables tested (education,
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47 employment, income, and insulin use). The personal mastery subscale was significantly
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49 associated with differences in age, country of birth, employment, income, insulin use, marital
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51 status and number of children. The religious/spiritual coping subscale was associated with
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4 differences in education, income, and number of children while the perceived self-efficacy
5 subscale significantly differed only according to the number of children each respondent had.
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10 Bivariate analyses of HbA1c and related variables indicated that individuals who self-identified
11 as traditional or religious had higher HbA1c levels than secular individuals (Table 3).
12
13 Additionally, younger patients, those with income levels at or below average (compared to those
14 with above average income), and patients prescribed insulin had higher levels of HbA1c. The
15 composite fatalism index was positively associated with HbA1c, explaining 6.1% of the
16 variance. When HbA1c was regressed independently on the three fatalism subscales, personal
17 mastery and religious/spiritual coping, but not perceived self-efficacy, were significantly
18 associated with HbA1c. Personal mastery was most strongly associated with HbA1c, explaining
19 3.6% of the total variance.
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32 Table 4 presents the multivariable analyses to identify how fatalism is associated with HbA1c
33 while controlling for self-reported religiosity and demographic and diabetes-related variables.
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35 The fatalism index remained significantly associated with HbA1c after controlling for age,
36 income, and insulin use ($\beta = 0.51, p = 0.01$; Table 4, Model 1), but was no longer significantly
37 associated after controlling for religiosity ($\beta = 0.31, p = 0.13$; Table 4, Model 2). As shown in
38 Model 2, holding the fatalism index constant and controlling for all demographic and diabetes-
39 related variables, those identifying as religious had HbA1c levels 0.86 units higher than secular
40 individuals ($p = 0.05$) yet a Wald test indicated that the religiosity variable was not significantly
41 related to HbA1c ($F(2,174) = 1.96, p = 0.14$).

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56 Post-hoc Pearson correlation analyses showed the expected relationship between the composite
57 fatalism index and each of its subscales (Table 5). There was little to no correlation among the
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4 fatalism subscales. Religiosity was positively associated with the composite fatalism index ($r =$
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6 0.45) and strongly correlated with the religious/spiritual coping subscale ($r = 0.69$) while it was
7
8 not correlated with the other subscales. Analyses using Spearman correlations yielded similar
9
10 results.
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13 14 15 **Discussion**

16
17 There is evidence that religiosity confounds the relationship between fatalism and HbA1c. After
18
19 controlling for demographic and diabetes-related characteristics, fatalism was significantly
20
21 associated with HbA1c, but only when self-reported religiosity was not included in the model.
22
23 Its inclusion resulted in a 33% decrease in the magnitude of the association between fatalism and
24
25 HbA1c (from $\beta = 0.51$ to $\beta = 0.31$; Table 4), resulting in a non-significant association. Two
26
27 findings indicate that the religiosity affects the fatalism index via its relationship with the
28
29 religious/spiritual coping subscale of this measure. First, there is a high correlation between
30
31 religiosity and the religious/spiritual coping subscale ($r = 0.69$) while the correlation between
32
33 religiosity and the other two subscales is near zero. Second, as shown in Table 2, similar trends
34
35 in the mean values of the fatalism index and the religious/spiritual coping subscale exist across
36
37 the three categories of self-reported religiosity. The same pattern, though, is not present for the
38
39 other two fatalism index subscales. This confounding relationship could indicate that fatalism
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41 and religiosity are measuring the same thing, or that mediation or moderation plays a role in the
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43 relationship between fatalism, religiosity, and HbA1c.
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52 Bivariate analysis indicates that the personal mastery subscale is significantly associated with
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54 HbA1c, but the perceived self-efficacy subscale is not. While both variables assess control-
55
56 related constructs, the personal mastery scale measures control/powerlessness on a broad
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4 spectrum (Seeman 1991) and the perceived self-efficacy subscale assess powerlessness (Egede &
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6 Ellis 2010) specifically in the context of diabetes/health. This dichotomy in control variables has
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8 been previously identified by Skaff et. al. (2003), who defined the construct assessed by the
9
10 personal mastery scale as *global* control and the construct assessed by the perceived self-efficacy
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12 scale as *domain-specific* (i.e, diabetes) control. The sample of the current study consists of
13
14 individuals who have been living with severe diabetes for an average of 14.4 years. An inability
15
16 to manage their diabetes over this long period may result in low reporting of domain-specific
17
18 control throughout the population regardless of HbA1c. Global control, though, may be
19
20 sufficiently variable throughout the population to lead to a significant association with HbA1c.
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22 As Table 2 indicates, the relationship between duration of diabetes and personal mastery
23
24 approaches significance ($p = 0.059$), while the relationship between duration of diabetes and
25
26 perceived self-efficacy does not ($p = 0.945$). This is additional evidence that continued exposure
27
28 to the disease has a stronger association with domain-specific control in comparison to global
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30 control. This is not entirely surprising as Rotter (1975) recognized that locus of control varied
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32 based on context and noted “(e)xpectancies in each situation are determined...by specific
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34 experiences in that situation.” As a result, there has been a call for more specific locus of control
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36 scales. These results support that suggestion.
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47 The diabetes self-management measures did not have sufficient variability to allow for useful
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49 analysis. A possible explanation is social desirability, e.g., participants over-reporting their
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51 adherence to diabetes self-management behaviors, which has been shown to bias self-report
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53 measures (Hebert et al. 1995; Van de Mortel 2008). The clinical setting of the survey and the
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55 severity of their disease could have exacerbated this issue if patients felt pressure to represent
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57 themselves as adequately addressing their illness.
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4 It is often assumed that fatalistic attitudes lead to elevated HbA1c levels, but there is the
5 possibility of reverse causation such that continued inability to effectively manage diabetes
6 results in increased fatalistic beliefs. This is particularly plausible given that fatalism, mastery,
7 powerlessness, and other related constructs have variable definitions throughout the literature,
8 which may indicate that they are culturally-derived explanations for various combinations of
9 similar functional phenomena. For instance, the attribution of diabetes to a higher theological
10 power may be due to social praise received for devoutness as well as the tempering of (self-
11 directed and social) criticism for failure to control blood sugar. Similarly, personal
12 mastery/control may reflect a history of engaging in behaviors with delayed reinforcement such
13 as eating a well-balanced diet or being physically active, which is a learned skill rather than an
14 innate difference between individuals. This suggests that fatalistic attitudes might be modified in
15 a way that improves diabetes outcomes via stimulus control (Hovell et al. 2009).
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34 This study's strengths include the use of the objective HbA1c levels as a proxy for diabetes
35 management and the high percentage of individuals completing the survey in its entirety. The
36 study is limited by the non-representative nature of the sample and the reliance on self-report
37 measures for religiosity, fatalism, and behaviors.
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45 **Conclusion**

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48 This study demonstrated that there is an association between fatalism and HbA1c, but self-
49 reported religiosity likely confounds this relationship via its interaction with the
50 religious/spiritual coping subscale of the fatalism index. The association between fatalism and
51 diabetes outcomes is consistent with previous findings and suggests that reducing fatalistic
52 beliefs, particularly those associated with broad concepts of control, may be a viable strategy for
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4 managing diabetes. However, there is a need for better understanding the interplay between
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6 religiosity and fatalism in this context.
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Table 1: Demographic and Diabetes-Related Sample Characteristics (N = 183)	
Characteristic	% or mean (SD)
Age	65.7 (9.2)
Sex (female)	56.8
Country of birth	
Israel	45.4
Other	54.6
Education level	
Below high school	20.8
High school	39.9
Above high school	39.3
Employment status (unemployed)	68.9
Income	
Below the mean	15.4
Mean	55.5
Above the mean	29.1
Religiosity	
Secular	50.8
Traditional	41.5
Religious	7.7
Marital status (Married)	76.0
Insulin user (Yes)	58.5
Hemoglobin A1c	8.4 (1.6)
Duration of diabetes (Years)	14.4 (8.4)

Table 2: Mean Values for the Total Diabetes Fatalism Index and Diabetes Fatalism Subscales by Demographic and Diabetes-Related Characteristics

Characteristic	Fatalism Index		Personal Mastery		Perceived Self Efficacy		Religious/Spirituality Coping	
	Mean	<i>p</i> ^a	Mean	<i>p</i> ^a	Mean	<i>p</i> ^a	Mean	<i>p</i> ^a
Self-reported religiosity		< .001		0.859		0.271		< .001
Secular	1.94		2.54		1.81		1.34	
Traditional	2.39		2.59		1.66		2.73	
Religious	2.68		2.49		1.71		3.67	
Age ^b		0.150		0.033		0.526		0.599
65 and below	2.12		2.43		1.77		2.05	
66 and above	2.25		2.69		1.71		2.14	
Sex		0.127		0.053		0.465		0.784
Female	2.24		2.42		1.77		2.11	
Male	2.11		2.66		1.71		2.07	
Country of birth		0.093		0.043		0.785		0.548
Israel	2.25		2.42		1.73		2.04	
Other	2.11		2.67		1.75		2.14	
Education level		0.021		0.824		0.145		0.001
Below high school	2.36		2.55		1.71		2.66	
High school	2.22		2.60		1.84		2.06	
Above high school	2.06		2.51		1.66		1.83	
Employment status		0.001		< .001		0.675		0.166
Unemployed	2.28		2.72		1.75		2.17	
Employed	1.97		2.19		1.71		1.92	
Income		0.001		0.023		0.180		0.045
Below the mean	2.37		2.79		1.88		2.26	
Mean	2.25		2.62		1.75		2.22	
Above the mean	1.94		2.31		1.64		1.75	
Insulin user (Yes)		0.023		0.031		0.499		0.233
Yes	2.26		2.67		1.77		2.18	
No	2.07		2.40		1.71		1.97	
Marital status		0.528		0.005		0.974		0.133
Not Married	2.23		2.86		1.74		1.86	
Married	2.17		2.46		1.74		2.17	
Number of children ^b		0.623		0.025		0.004		0.018
< 3	2.21		2.71		1.88		1.87	
3 and above	2.17		2.43		1.63		2.28	
Duration of diabetes (Years) ^b		0.248		0.059		0.945		0.926
< 14.4	2.14		2.44		1.74		2.09	
14.4 and above	2.23		2.68		1.74		2.10	

^a *p*-values from F-tests of equal means

^b categories separated according to the mean values

Table 3: Bivariate Associations Between Demographic and Diabetes-Related Characteristics and HbA1c

	β	SE	p	r^2
Fatalism Index	0.692***	0.20	< .001	0.061
Personal Mastery	0.363*	0.14	0.010	0.036
Perceived Self Efficacy	0.331	0.20	0.104	0.015
Religious/Spirituality Coping	0.203*	0.10	0.046	0.022
Self-reported religiosity				0.047
Secular		referent		
Traditional	0.488*	0.24	0.045	
Religious	1.172*	0.45	0.010	
Age (Years)	-0.042***	-0.01	< .001	0.059
Duration of diabetes (Years)	0.022	-0.01	0.122	0.013
Country of birth (Israel)	0.445	-0.23	0.060	0.020
Sex (Female)	0.403	0.24	0.090	0.016
Marital Status (Married)	-0.486	-0.27	0.078	0.017
Number of children	-0.026	-0.09	0.774	0.001
Education level				0.023
Below high school	0.589	0.32	0.065	
High school	0.422	0.26	0.111	
Above high school		referent		
Employment Status (Unemployed)	-0.086	-0.25	0.737	0.001
Income				0.057
Below the mean	1.174***	0.36	< .001	
Mean	0.551*	0.26	0.038	
Above the mean		referent		
Insulin user (Yes)	0.977***	0.23	< .001	0.092

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Multivariate Associations Between Demographic and Diabetes-Related Characteristics and HbA1c

	Model 1			Model 2		
	β	SE	<i>p</i>	β	SE	<i>p</i>
Fatalism Index	0.51	0.20	0.01*	0.34	0.22	0.130
Self-reported religiosity		-				
Secular		-			referent	
Traditional	-	-	-	0.19	0.24	0.427
Religious	-	-	-	0.86	0.44	0.050
Age (Years)	-0.046	0.012	< .001***	0.04	0.01	< .001***
Income						
Below the mean	0.84	0.34	0.02*	0.93	0.35	0.008**
Mean	0.52	0.25	0.04*	0.55	0.25	0.031*
Above the mean		referent			referent	
Insulin user (Yes)	0.86	0.22	< .001***	0.87	0.22	< .001***
	$r^2 = 0.23$			$r^2 = 0.25$		
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

Table 5: Pearson Correlation Matrix

	Composite Fatalism	Personal Mastery	Perceived Self-Efficacy	Religious/Spiritual Coping	Religiosity
Composite Fatalism	1.00	-	-	-	-
Personal Mastery	0.69	1.00	-	-	-
Perceived Self-Efficacy	0.47	0.35	1.00	-	-
Religious/Spiritual Coping	0.68	0.01	-0.02	1.00	-
Religiosity	0.45	0.01	-0.10	0.69	1.00

Appendix 1 - Questionnaire

1. How long have you been a diabetic? _____

2. What treatment do you get for your diabetes?

1. Insulin 2. Medication 3. I do not get any medication.

3. How would you evaluate your health generally?

1. Bad 2. Not so good 3. Good 4. Very Good 5. Great

4. What is the level of your HbA1C lately? _____

Management of Diabetes Care

Self-Treatment

<i>To what extent do you:</i>	NEVER	INFREQUENTLY	SOMETIMES YES SOMETIMES NO	NEARLY ALWAYS	ALWAYS
5. Measure your glucose at home?	1	2	3	4	5
6. Take your medication for diabetes?	1	2	3	4	5
7. Check your feet?	1	2	3	4	5
8. Go to follow up visits with your doctor regarding your diabetes?	1	2	3	4	5
9. Go to the dietician?	1	2	3	4	5

Healthy Lifestyle Management

<i>To what extent do you:</i>	NEVER	INFREQUENTLY	SOMETIMES YES SOMETIMES NO	NEARLY ALWAYS	ALWAYS
10. Eat according to recommendations?	1	2	3	4	5
11. Eat at least 5 or more fruits and vegetables a day?	1	2	3	4	5
12. Do you eat food with more than 5% fat?	1	2	3	4	5
13. Engage in physical activity?	1	2	3	4	5
14. Smoke even one puff?	1	2	3	4	5

Tests

<i>Have you in the past year done:</i>	YES	NO
15. HBA1C?	1	0
16. Blood lipids?	1	0
17. Urine microalbumin?	1	0
18. Eye test?	1	0
19. Check feet in clinic?	1	0

Diabetes Complications

<i>Do you have:</i>	YES	NO
20. High blood pressure?	1	0
21. High levels of Blood lipids?	1	0
22. Eye problems?	1	0
23. Kidney problems?	1	0
24. Problems with feeling in feet and fingers?	1	0

Fatalism

<i>To what extent do you agree with:</i>	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEUTRAL	SOMEWHAT AGREE	STRONGLY AGREE
25. I have little control over things that happen to me.	1	2	3	4	5
26. Most of what will happen to me depends on me.	1	2	3	4	5
27. There is no way that I can solve part of my problems.	1	2	3	4	5
28. There is little I can do to change things that are important to me.	1	2	3	4	5
29. I can do anything I put my mind to.	1	2	3	4	5
30. I often feel helpless when it comes to my problems.	1	2	3	4	5
31. The disease is a way for God to punish man.	1	2	3	4	5
32. Illness is fate.	1	2	3	4	5
33. Man has the responsibility for his health.	1	2	3	4	5
34. Faith in God helps me to deal with my diabetes.	1	2	3	4	5
35. I believe God did not give me more than I can deal with.	1	2	3	4	5
36. I believe God can cure my diabetes.	1	2	3	4	5
37. I pray about my diabetes so I don't have to worry about it.	1	2	3	4	5
38. I believe I can control my diabetes just as the medical staff expects of me to.	1	2	3	4	5
39. If I do all the doctor tells me to do I can prevent the complications.	1	2	3	4	5
40. I believe diabetes can be controlled.	1	2	3	4	5
41. Diabetes is a matter of fate, that is why I cannot do anything about it.	1	2	3	4	5
42. When there is a family history of type-2 diabetes it cannot be prevented.	1	2	3	4	5

Demographics

43. Sex

1. Male 2. Female

44. Age _____

45. Country of Birth _____

46. Year of Immigration _____

47. Marital Status

1. Married 2. Single 3. Divorced 4. Widowed

48. Number of Children _____

49. Number of Years of Education _____

50. Work Status

1. Does not work 2. Part-time work 3. Full-time work

51. The mean household income in Israel is 8500 NIS, is yours:

1. Under the mean 2. Mean 3. Above the mean

52. How do you define yourself?

1. Jewish 2. Christian 3. Muslim 4. Druze

53. Religiosity

1. Secular 2. Traditional 3. Religious