

# Factors Associated With Psychological Insulin Resistance in Individuals With Type 2 Diabetes

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**OBJECTIVE** — To describe the predictive relationships of selected sociodemographic, biomedical, and psychosocial variables to reluctance to use insulin among patients with type 2 diabetes.

**RESEARCH DESIGN AND METHODS** — A total of 178 patients with type 2 diabetes participated in this cross-sectional, observational study. Data were obtained by patient interview using validated measures of diabetes attitude, knowledge, self-efficacy, care communication, and perceived barriers to treatment, as well as sociodemographic and biomedical data.

**RESULTS** — Women and ethnic minorities with type 2 diabetes have more psychological barriers to insulin treatment ( $P < 0.05$ ). The final regression model showed that individuals who believed in the value of tight glucose control, had strong self-efficacy, and had better interpersonal processes with their healthcare providers were less reluctant to use insulin treatment ( $R^2 = 0.403$ ;  $P < 0.0001$ ).

**CONCLUSIONS** — Diabetes self-efficacy and better interaction with clinicians were important in decreasing patients' reluctance to use insulin, known as psychological insulin resistance.

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Despite the known benefits of insulin, many patients are reluctant to use insulin therapy (1–3). A patient's reluctance to initiate insulin may be called “psychological insulin resistance” (PIR).

Little is known about what factors influence PIR. We examined the relationships among PIR, sociodemographic, biomedical, and psychosocial factors identified in previous studies (4–7) and tested a predictive model of PIR.

## RESEARCH DESIGN AND METHODS

A descriptive correlational cross-sectional survey of 178 adults recruited from urban residential areas of the San Francisco Bay Area was conducted. The participants were recruited through flyers posted at two adult general internal medicine clinics, the Diabetes

Teaching Center of a large west coast academic medical center, two local community clinics, and three local churches. The study was approved by the institutional review board of the academic medical center, and all participants provided written informed consent. Inclusion criteria were age 18 years or older, diagnosed with type 2 diabetes, being treated with diabetic oral agents, and able to speak English. Patients with type 1 diabetes, severe psychiatric disease (e.g., active schizophrenia and drug dependency), or dementia and those on current insulin treatment were excluded. Medical records were reviewed for clinical data, and data were collected in doctor's offices by face-to-face interview or by phone using the following validated questionnaires: Diabetes Attitude Scale (DAS-3) (8); Diabetes Knowledge Test (DKT) (9);

Diabetes Self-Efficacy Scale (DSES) (10); Interpersonal Processes of Care Survey-18 (IPC-18) (11); and Barriers to Insulin Treatment (BIT) scale (12).

Statistical analyses were performed using SPSS version 15.0. Results were described using Pearson correlation coefficients, Spearman rank correlation test, ANOVA, two-group *t* test, and hierarchical multiple regression. All tests were two-sided, and type I error was controlled at the 0.05 level. Because three instruments with five to seven subscales were used, a two-step approach was used to develop the final multivariate model. First, we constructed a separate multivariate model for each of the three instruments in order to choose significant subscales ( $P < 0.05$ ) related to PIR from each instrument for inclusion into the final model. We constructed a hierarchical multiple regression to examine the effects of the four demographic variables (selected from significant correlation [ $P < 0.05$ ] with PIR), the seven subscales, and possible interactions among the IPC subscales, i.e., the DAS-3 and DSES subscales on PIR.

**RESULTS** — Of the 196 potential individuals who were approached and invited to participate in this study, 10 did not meet the inclusion criteria and 8 declined participation. A total of 178 patients consented and participated. Study sample characteristics and the descriptive statistics for the DAS 3, DKT, DSES, IPC, and BIT are presented in Table 1.

The overall PIR across respondents was moderate, with a mean of 4.89 on a scale of 1 to 10. Women had higher fear of injections ( $P < 0.001$ ) stigmatization ( $P = 0.01$ ) and overall a higher mean BIT score, reflecting more reluctance to use insulin than men ( $P = 0.008$ ). Asians had significantly higher fear of injections ( $P = 0.003$ ) and expected greater hardship in using insulin than whites ( $P = 0.03$ ). Overall, Asians were more reluctant to use insulin than whites ( $P = 0.012$ ). Other minority groups (Hispanics, American Indians, and Pacific Islanders) also had significantly higher fear of injection than whites ( $P = 0.031$ ).

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All subscales of the IPC had a negative association with PIR ( $P < 0.01$ ), indicating that better perceived interaction with health care providers was associated with lower level of PIR. In the final multivariate model, the linear combination of the predictors in the model was significantly related to PIR ( $R^2 = 0.403$ ;  $P < 0.0001$ ). Individuals who believed in the value of tight glucose control and had better interpersonal processes with their health care providers were less reluctant to use insulin treatment. The inverse relationship between PIR and exercise self-efficacy was stronger for those with greater interpersonal communication processes scores with health care providers. Those with stronger exercise self-efficacy were less reluctant to initiate insulin treatment. This relationship is modified by interpersonal care process with health care providers.

**CONCLUSIONS**— Our findings showed that adults with type 2 diabetes treated by oral agents had moderate PIR, which is consistent with results in a prior study by Polonsky et al. (13). Fear of hypoglycemia was the strongest barrier to insulin treatment while expected hardship in using insulin influenced the PIR minimally. Fear of hypoglycemia is important to discuss with patients to educate them that hypoglycemic episodes can often be avoided through adjustment of insulin and careful vigilance in self-monitoring of blood glucose.

Women were more reluctant to begin insulin treatment and indicated a greater fear of injection and social stigmatization in using insulin than men. These results are of particular concern, because it has been shown that women with diabetes are less likely than men to have A1C  $< 7\%$  and are at greater risk of diabetes-associated coronary heart disease than men (14).

As demonstrated in a previous study (13), ethnic minorities had greater PIR than whites. Asians and other nonblack minority groups had significantly higher fear of injections and expected greater hardship in using insulin than whites.

This study has some limitations. Our participants had relatively good glycemic control with their oral medications. The study findings may not be generalizable to the patients with severe hyperglycemia. Future research is needed to better understand PIR. The BIT was used as a surrogate variable to measure PIR, and thus we cannot conclude that patients with many barriers to insulin treatment will actually reject insulin treatment when it is recom-

**Table 1—Characteristics of the study sample (n = 178) and descriptive statistics for the instruments**

Age (years)	64.3 ± 13.54
A1C (%)*	6.98 ± 0.99 (5.2–11.0)
Duration of diabetes (years)	7.03 ± 4.07
Sex	
Male	82 (46.1)
Female	96 (53.9)
Race	
Asians	58 (32.6)
Blacks	45 (25.3)
Whites	56 (31.5)
Other†	19 (10.6)
Education	
Less than high school	14 (7.9)
High school graduate	36 (20.2)
Some college, 1–3 years	65 (36.5)
Bachelor's degree	36 (20.2)
Graduate degree	27 (15.2)
Income (U.S.D.)	
Less than \$10,000	28 (15.7)
\$10,000~\$29,999	41 (23.0)
\$30,000~\$49,999	37 (20.8)
\$50,000~\$69,999	21 (11.8)
\$70,000~\$99,999	19 (10.7)
Greater than \$100,000	32 (18.0)
DAS-3 (scale range)	
Need for special training (1–5)	4.20 ± 0.37 (2.4–5.0)
Seriousness of diabetes (1–5)	3.75 ± 0.52 (2.57–5.0)
Value of tight control (1–5)	3.71 ± 0.50 (2.14–5.0)
Psychosocial impact of diabetes (1–5)	3.68 ± 0.57 (2.0–5.0)
Patient autonomy (1–5)	3.68 ± 0.42 (2.5–4.75)
DKT (0–100%)	67.22 ± 18.88 (21.43–100.0)
DSES (scale range)	
Sum (1–6)	4.54 ± 0.77 (2.06–5.94)
Diabetes routine (1–6)	5.04 ± 0.85 (1.75–6.0)
Self-treat (1–6)	4.62 ± 1.02 (1.0–6.0)
Certainty (1–6)	4.20 ± 1.23 (1.25–6.0)
Diet (1–6)	4.27 ± 1.28 (1.0–6.0)
Exercise (1–6)	4.41 ± 1.44 (1.0–6.0)
IPC-18 (scale range)	
Communication	
Lack of clarity (1–5)	4.03 ± 0.99 (1.0–5.0)
Elicited concern (1–5)	4.16 ± 0.85 (1.33–5.0)
Explained results (1–5)	4.46 ± 0.81 (1.0–5.0)
Decision making	
Worked together (1–5)	3.79 ± 1.01 (1.0–5.0)
Interpersonal style	
Compassionate, respectful (1–5)	4.34 ± 0.72 (1.33–5.0)
Discriminated due to race/ethnicity (1–5)	4.76 ± 0.60 (2.0–5.0)
Disrespectful office staff (1–5)	4.50 ± 0.80 (1.5–5.0)
BIT (scale range)	
Sum (1–10)	4.89 ± 1.63 (1.0–10.0)
Fear of injection (1–10)	4.44 ± 2.87 (1.0–10.0)
Expectations regarding positive outcome (1–10)	5.49 ± 2.13 (1.0–10.0)
Expected hardship (1–10)	3.34 ± 2.60 (1.0–10.0)
Stigmatization (1–10)	5.31 ± 2.55 (1.0–10.0)
Fear of hypoglycemia (1–10)	6.38 ± 2.71 (1.0–10.0)

(continued)

Table 1—Continued

Number of comorbidities‡§	
0	118 (66.3)
1	42 (23.6)
2	7 (3.9)
3	1 (0.6)
Missing	10 (5.6)
Number of microvascular diabetic complications‡	
0	146 (82.0)
1	16 (9.0)
2	5 (2.8)
3	1 (0.6)
Missing	10 (5.6)

Data are means ± SD (range), or n (%). \*n = 158. †Other: American Indians or Alaska Natives, Native Hawaiian, or Pacific Islander. ‡n = 168. §Comorbidities: congestive heart failure, chronic obstructive pulmonary disease, and arthritis.

mended by their health care providers. However, Petrak et al. (12) previously demonstrated the clear predictive validity of all BIT questionnaire scales to reluctance to use insulin. Patients who preferred oral antidiabetic medications consistently reported significantly higher barriers to insulin treatment than those willing to move on to insulin.

In summary, patient self-management education that is focused on improving self-efficacy, the consideration of sex and race differences in PIR, and enhanced patient-provider communications are necessary to decrease PIR. Future research should be directed toward understanding and promotion of the interpersonal processes of care between patients and their health care providers and are needed for the development of interventions to help patients overcome the barriers to accepting insulin therapy.

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