The vocational experiences and general well-being of 58 young adult subjects (mean age 24.3 yr) with insulin-dependent diabetes mellitus (IDDM) diagnosed during their adolescence were compared with that of 55 healthy matched control subjects with linear logistic discriminant function analyses. Assessment measures included the Rand General Well-Being Scale and the Rand Functional Limitations and Physical Abilities Batteries. Diabetic subjects, on average, reported significantly lower general well-being than control subjects, particularly in terms of health-related fears and feelings of depression. However, diabetic subjects did not report a pervasive functional deficit relative to control subjects and experienced similar employment rates and problems in the workplace. These results suggest that this group of young adult diabetic subjects has adjusted well to the demands of the workplace despite lower reports of general well-being. The results are discussed in light of relevant sampling issues.

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Recent research on adjustment to diabetes has focused largely on psychosocial factors (1-9), coping strategies (10-12), or the relationship between these variables and disease control (13-21). Children with diabetes do not appear to differ from children with acute physical conditions (e.g., fractures) or control children in terms of psychosocial adjustment as defined by various variables including psychiatric interview, self-esteem, and behavioral symptoms (1,4). Similarly, the well-being of adult diabetic patients has been found to be similar to that of patients with various other acute and chronic physical disorders and does not differ from that of the population at large (2). Attempts to identify a diabetic personality have not met with success (12,20,22).

Fewer studies have investigated behavioral adaptation to diabetes mellitus. Wertlieb et al. (9) found no differences between children with diabetes and children with acute illnesses in terms of behavioral symptomatology as measured by the Child Behavior Checklist. A survey of 38 young adults with diabetes found that 27 were employed outside the home, although little information was provided regarding types of occupation or job performance (23). Silver (24) described a vocational program for visually impaired individuals with diabetes but did not discuss the demand for such a program or the vocational needs of visually nonimpaired diabetic individuals. The National Health Interview Survey (NHIS) of the National Center for Health Statistics was used to ask questions about diabetes in 39,615 households throughout the United States from 1979 to 1981. From a total sample of 154,332 adults, 5337 adults >20 yr of age were identified as having diabetes (25). Among the findings of the NHIS regarding adults with diabetes were 1) diabetic subjects were less educated than the general population (54.0% completed <12 yr of school compared with 29.3% of the general population), 2) diabetic subjects were less likely to be employed (47.9% compared with 76.1% of the general population, with differences increasing with age), and 3) diabetic subjects were more likely to be retired for health reasons (21.0% compared with 5.0% of the general population) (25).
Diabetic and nondiabetic subjects reported having similar living arrangements (living with spouse, relatives, nonrelatives, or alone) (25).

To our knowledge, no controlled study has investigated the vocational functioning of young adults who were diagnosed during their childhood with diabetes mellitus. Such information has potential importance for identifying the special needs of these individuals in schools and in the workplace and is the first step toward meeting these needs. Jacobson (22) suggested that the identification of specific, even subtle, effects of diabetes could lead to more targeted psychosocial interventions and may help health-care providers orient their educational efforts. The purpose of this study is to 1) describe the vocational status of a sample of young adults with diabetes mellitus and 2) attempt to identify a subset of characteristics related to vocational and functional status that might be unique to diabetic patients.

RESEARCH DESIGN AND METHODS

Participants in this study were young adults between the ages of 18 and 36 yr with insulin-dependent diabetes mellitus (IDDM) diagnosed during their childhood and adolescence. Individuals meeting these inclusion criteria were identified from the medical records at two locations: Buffalo Children's Hospital (BCH), a public medical facility, and the office of a private practitioner specializing in endocrinology, both in the downtown Buffalo, New York, area. Recruitment of subjects from public and private facilities ensured the selection of a more representative sample of the Buffalo area's diabetic population than would the exclusive reliance on either type of facility.

The review of records produced 145 BCH patients and 48 private practice patients who met the inclusion criteria. These patients were mailed a packet containing a cover letter briefly describing the purpose and aims of the study, a more detailed statement of informed consent, and two questionnaires. Patients who did not respond within ~2–4 wk were mailed a packet identical to the first except that the cover letter stressed the importance of a high participation rate and urged the patient to complete the questionnaires. Twelve BCH patients and 1 private practice patient had moved without a forwarding address and did not receive our correspondence. Of the 133 BCH and 47 private practice patients who presumably received our correspondence, 39 (29%) and 21 (45%) returned the questionnaires, respectively. Two BCH subjects returned incomplete questionnaires and were excluded from the study; thus, the final number of patients with diabetes was 37 from BCH and 21 from private practice.

Control subjects were recruited through a random digit-dialing procedure in which diabetic subjects' telephone numbers were dialed with the last two digits randomized. This procedure provides a rough geographical matching of diabetic and control groups and may or may not result in a control group that reflects the health status of the general population. Control subjects who agreed to participate were mailed a packet containing the consent form and questionnaires. Although exact records of the number of refusals were not kept, the participation rate among control subjects was similar to that of diabetic subjects. Control subjects who had agreed to participate in the study but did not respond within 2–4 wk were sent a reminder letter similar to that sent to diabetic subjects. Diabetic and control groups were compared on the demographic variables of age, sex, marital status, and living situation according to the following statistical conventions: 1) continuous variables were analyzed with Student's t tests and 2) categorical variables were analyzed with χ2-tests if all expected cell frequencies were ≥5 and by Fisher's exact tests if any cell had an expected frequency of <5. The results of these analyses are presented in Table 1. Diabetic participants and nonparticipants were also compared on the variables of sex, age, and duration of diabetes to assess possible sample bias (Table 2).

MEASURES. The Rand Health Insurance Study General Well-Being measure (GWB), a 22-item questionnaire, was used to evaluate general well-being. The items are a series of self-statements that are followed by a choice...
of six descriptions of how true the self-statement has been during the past month. The items tap various dimensions, both physical and psychological, including anxiety, depression, general health, positive well-being, self-control, and vitality. Internal consistency reliability, with Cronbach’s α, is 0.94 for the full scale, and the measure has demonstrated good predictive and concurrent validity (26).

The Rand Health Insurance Study Functional Limitations Battery (FLB) and Physical Abilities Battery (PAB) were used to assess functional status. The FLB includes 11 questions that inquire about various functional limitations, e.g., ability to drive a car, general mobility, ability to do physical work, and other activities in which one can participate. The PAB contains 12 items that inquire about the ability to care for oneself (e.g., eat, dress, and use a bathroom without assistance) and the degree of physical activity in which a person can engage. In addition, information regarding participants’ background and demographic information, including vocational status, was elicited. Other variables assessed included job-related problems actually experienced or problems that were of concern to the subjects, e.g., ability to keep pace with the job, on-the-job fatigue, problems of concentration, and job satisfaction. Diabetic participants were asked whether certain changes in the workplace would facilitate their return, and whether they had been rejected for various kinds of insurance, employment, or benefits because of their illness.

**Table 2**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Participants</th>
<th>Nonparticipants</th>
<th>Test used</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>24.3 ± 5.5</td>
<td>23.4 ± 4.9</td>
<td>T</td>
<td>0.248</td>
</tr>
<tr>
<td>Duration of diabetes</td>
<td>12.7 ± 5.6</td>
<td>12.3 ± 5.9</td>
<td>T</td>
<td>0.629</td>
</tr>
</tbody>
</table>

CS, χ²-test; T, Student’s t test. Values are means ± SD.

**RESULTS**

The demographic composition of diabetic and control groups was similar in terms of sex, age, marital status, occupation, and duration of diabetes (Table 1). However, the groups differed in terms of living situation, with more control subjects living alone and more diabetic subjects living with their parents. Diabetic subjects who participated in this study were similar to nonparticipants in terms of age; however, the groups were marginally different (P < 0.09) in terms of sex: 62.1% of participants and 46.7% of nonparticipants were women (Table 2).

Logistic discriminant analysis of the overall score on the GWB scale (category 1) revealed a significant relationship between general well-being and disease status. GWB scores ranged from 40 to 124 (mean ± SD 91.8 ± 20.2) for diabetic subjects and 58 to 127 (101.0 ± 14.7) for control subjects.

One item on the GWB scale pertaining to physical well-being (category 2) discriminated significantly between groups: diabetic subjects reported more concerns and fears about their health, on average, than did control subjects. Similarly, one item on the GWB scale pertaining to psychological well-being (category 3) discriminated significantly between groups: diabetic subjects reported feeling more depressed, on average, than did control subjects.

Disease status was not predicted to a significant degree by either employment status (category 4) or length of time in current job and income (category 5). Seventy-
eight percent of diabetic subjects and 76% of control subjects were employed either part time or full time.

Participants were asked if they had ever experienced discrimination in hiring or promotion or had problems performing their job or using job-related facilities and about a series of five additional job-related problems (category 6). More diabetic (15 of 55) than control (2 of 54) subjects reported problems performing their job. Subjects were also asked whether they had worried about any of these job-related problems (category 7). More diabetic (15 of 56) than control (5 of 55) subjects worried about concentration problems at work.

One of 11 FLB items (category 8) discriminated significantly between groups: more diabetic (24 of 58) than control (4 of 54) subjects reported that their health limited them from doing things they wanted to do. None of the 12 PAB items (category 9) discriminated significantly between groups.

A summary of items that significantly discriminated between groups is shown in Table 3. Diabetic subjects were lower in general well-being than control subjects, particularly in terms of depressed feelings and worry over health. In addition, diabetic subjects appeared more likely than control subjects to experience difficulty performing their job and worried about lapses in concentration at work. Furthermore, diabetic subjects, on average, appeared more limited by their health than control subjects in the kinds of activities in which they could participate.

**Experiences of diabetic subjects.** Diabetic subjects were asked about illness-related experiences of rejection in applications for work or work-related benefits and insurance (Table 4). Eighteen percent of subjects had been rejected for health and life insurance, and 11% had been rejected for disability insurance. Nine percent of subjects felt they had been rejected for work they wanted to do. None of the 12 PAB items (category 9) discriminated significantly between groups.

**Living arrangements of diabetic subjects.** A comparison was made between diabetic subjects living with their parents and those who had other living arrangements (alone, with spouse, with roommate, or other). Diabetic subjects living with their parents had significantly more functional limitations (items from FLB) than did those with other living arrangements (Mann-Whitney U test, P = 0.0345). Diabetic subjects living with parents did not differ significantly from other diabetic subjects in terms of physical limitations (items from PAB, Mann-Whitney U test, P = 0.3594).

**DISCUSSION**

The GWB scale used in this study taps the subjects' perceptions of their physical well-being (e.g., energy level, illness, aches and pains) and emotional well-being (including positive items such as cheerfulness and participation in interesting activities and negative items such as feelings of depression and anxiety). As expected, diabetic subjects reported a lower mean level of general well-being than did control subjects. This deficit was most salient in terms of worries over health and feelings of depression.

The apparent deficit of diabetic subjects in general well-being was not prominently reflected in their responses to questions regarding functional limitations and physical abilities. Diabetic subjects were more likely to endorse the item, Does your health limit you in any way from doing anything you want to do?; however, there were no significant differences between groups on any of the 10 remaining items inquiring about functional limitations in various specific domains (e.g., driving a car, climbing stairs, doing housework). None of the 12 items assessing ability to perform various tasks ranging in physical vigor from extremely mild (e.g., Can you sit at a table for meals?) to extremely demanding (e.g., If you wanted to, could you participate in active sports such as swimming, tennis, basketball, volleyball, or rowing a boat?) produced significant between-group differences.

Diabetic and control subjects exhibited some differences in terms of workplace experiences. For example, diabetic subjects reported more difficulties in performing their jobs and reported a greater degree of worry about maintaining their concentration on the job. Dia-

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**TABLE 3**

Results of logistic discriminant analyses

<table>
<thead>
<tr>
<th>Variable category</th>
<th>Significant items</th>
<th>P</th>
<th>( P ) at entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWB total (1)</td>
<td>General well-being</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>GWB physical (2)</td>
<td>Worries about health</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>GWB psychological (3)</td>
<td>Feels depressed</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Job-related problems (6)</td>
<td>Performing job</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Job-related problems worried about (7)</td>
<td>Concentration</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td>FLB functional limitations (8)</td>
<td>Health limits activities</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

GWB, General Well-Being scale; FLB, Functional Limitations Battery. Category is in parentheses.
betic and control subjects did not appear to differ in terms of job-related anxiety or in the reported incidence of job loss and discrimination in hiring and promotion. Difficulty obtaining various types of insurance appeared to be a fairly common experience among individuals with diabetes.

Overall, the results of this study suggest that despite an apparent deficit in general well-being among individuals with diabetes mellitus relative to healthy individuals of similar background, people with diabetes appear about as successful as control subjects at obtaining employment and dealing with the demands of their jobs. Individuals with diabetes may be more likely to experience problems related to job performance; however, the overall pattern of results does not suggest a pervasive deficit in vocational adjustment. Further research seems warranted to investigate in greater detail the nature of the problems related to job performance to determine whether the demands of complying with treatment for diabetes (e.g., self-monitoring of blood glucose and strictly prescribed meal and snack times), the physical effects of diabetes, or some other cause result in problems related to job performance.

The results of this study must be interpreted within the context of relevant sampling issues. Unfortunately, despite several attempts to obtain participation from a larger percentage of the available pool of patients, a small percentage returned the questionnaires, thus potentially producing a bias in the study and creating a sample that may not be truly representative of the population. Furthermore, because the group of participating diabetic subjects was composed of a marginally greater proportion of women than the group of nonparticipating diabetic subjects, the results may more accurately reflect the experience of diabetic women than diabetic men.

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REFERENCES


