Diabetes distress and neighborhood characteristics in people with type 2 diabetes

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ABSTRACT

Objective: Diabetes-specific distress is an important psychological issue in people with diabetes. The neighborhood environment has the potential to be an important factor for diabetes distress. This study investigates the associations between neighborhood characteristics and diabetes distress in adults with type 2 diabetes.

Methods: We used cross-sectional data from a community-based sample of 578 adults with type 2 diabetes from Quebec, Canada. Information on perceived neighborhood characteristics and diabetes distress was collected from phone interviews. We used factor analysis to combine questionnaire items into neighborhood factors. Information on neighborhood deprivation was derived from census data. We performed linear regressions for diabetes distress and specific domains of diabetes distress (emotional, regimen-related, physician-related and interpersonal distress), adjusting for individual-level variables.

Results: Factorial analysis uncovered 3 important neighborhood constructs: perceived order (social and physical order), culture (social and cultural environment) and access (access to services and facilities). After adjusting for individual-level confounders, neighborhood order was significantly associated with diabetes distress and all specific domains of distress; neighborhood culture was specifically associated with regimen-related distress; and neighborhood access was specifically associated with physician-related distress. The objective measure of neighborhood material deprivation was associated with regimen-related distress.

Conclusions: Neighborhood characteristics are associated with diabetes distress in people with type 2 diabetes. Clinicians should consider the neighborhood environment reported by their patients with diabetes when assessing and addressing diabetes-specific distress.

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Introduction

The prevalence of diabetes in Canada is estimated at 5.5% and is expected to increase steadily in coming years [1]. Individuals living with diabetes often face lifelong self-management regimens often involving significant changes in their lifestyle and adherence to complex medication procedures. Individuals with diabetes also need to prevent and manage diabetes complications, concurrent health problems and functional limitations [1,2]. Diabetes distress is a multi-domain construct which captures the worry, frustration and discouragement that may accompany life with diabetes. It encompasses regimen-related distress, physician-related distress, emotional burden and diabetes-related interpersonal distress [3–5]. Distress over diabetes regimen relates to the worries and discouragements that patients may have about self-managing their disease, such as perceived difficulties in following their diet or maintaining their diabetes routine [6–8]. Distress related to physician includes concerns about access to healthcare and quality of care, such as worries that recommendations provided by healthcare professionals may be incomplete [6,9]. Emotional burden is another source of diabetes distress that refers to the negative mental and emotional aspects of life with diabetes. This includes feelings such as despair, anger or fear when thinking about a lifetime with diabetes or feeling overwhelmed by the demands of diabetes. Finally, interpersonal distress such as lack of social support may contribute to diabetes distress by limiting emotional support or making it more difficult to maintain a healthy lifestyle [6]. Diabetes distress is a psychological issue distinct from depression and anxiety [10]. It has been found to be more common and persistent than depression in people with diabetes [5,10,11]. It is associated with poorer glycemic control, self-care behaviors and medication adherence, even above and beyond depressive symptoms [12–16].

Although diabetes distress is an important outcome for people with diabetes, relatively little is known of the predictors and correlates of diabetes distress. One study identified individual-level variables associated with diabetes distress, including a greater number...
of diabetes complications, negative life events or chronic stress, a
history of depression and an unhealthy lifestyle [17]. The neigh-
borhood where people live could be an important additional factor
for diabetes distress. People with diabetes are often recommended
to exercise more frequently and improve their diet. Living in a
neighborhood with limited access to healthy food and safe places
to exercise can be an important barrier for diabetes self-care [18]
and may be a source of diabetes distress. A lack of community
resources and support may also limit a person’s ability to manage
and may be a source of diabetes distress. Results showed an
association between neighborhood socioeconomic status and depressive symptoms in a clinical sample of obese patients
with type 2 diabetes. No study has specifically focused on neigh-
borhood factors in diabetes distress.

The primary objective of this study was to investigate the associa-
tions between a range of neighborhood characteristics and diabetes
distress, in a representative sample of adults with type 2 diabetes.
The secondary objective was to examine the association between
neighborhood characteristics and the specific domains of diabetes
distress (regimen-related, physician-related, emotional, interpersonal
distress).

Methods

Study population

We used data from a sub-sample of the Diabetes Health and Well-
being Study (DHS), a random digit-dialing survey of 2003 community-
dwelling adults with diabetes, living in Quebec, Canada [22]. The DHS
started in 2008 and follow-ups are annual. In 2011, we conducted a
sub-study using a sub-sample of DHS participants with type 2 diabetes
who lived in urban and semi-urban areas (determined from postal
codes). The purpose of the sub-study was to add missing information
on diet, physical activity and neighborhood environment to the DHS.
A total of 680 participants accepted and provided verbal consent
and 600 were subsequently telephone interviewed. For this study, we
included participants with information on diabetes distress (n = 578).
We found no significant differences in baseline socio-demographic and
lifestyle characteristics between DHS sub-study participants and non-
participants with type 2 diabetes living in urban or semi-urban areas,
except that DHS sub-study participants were slightly more likely to
be working (39.0% vs 31.5%, p = 0.007) and less likely to be smokers
(17.5% vs 23.0%, p = 0.006) than non-participants.

Diabetes distress

Diabetes distress was measured using the 17-item Diabetes
Distress Scale (DDS) [4]. The DDS has shown good validity and internal
consistency (α = 0.93) [4]. The scale explores four domains of distress
potentially related to living with diabetes: emotional burden (5 items,
such as “feeling that diabetes is taking up too much of my mental and
physical energy every day”), physician-related distress (4 items, such as
“feeling that my doctor doesn’t give me clear enough directions
on how to manage my diabetes”), regimen-related distress (5 items,
such as “feeling that I am often failing with my diabetes routine”) and
diabetes-related interpersonal distress (3 items, such as “feeling
that friends or family are not supportive enough of self-care efforts”).
Items are rated on a Likert scale from 1 (not a problem) to 6 (very
serious problem). We calculated a mean global diabetes distress score
and mean scores for each domain-specific subscale by dividing the
total score of the scales by the number of questions (range between 1
and 6). Previous research suggests a mean score of ≥2 to indicate
moderate to high diabetes distress [3].

Neighborhood characteristics

Based on a review of the literature, we developed a 35-item neigh-
borhood questionnaire using existing items from different works
[23–28]. Items were rated on a yes/no scale or on a 4- or 5-point Likert
scale. The questionnaire was pilot tested and translated to French. The
measurement of residential environment from self-report is a relatively
new area of research, and single item measures have shown overall
moderate validity [23] and reliability [29].

Neighborhood deprivation was estimated using the Pampalon Dep-
 rivation Index [30]. The Pampalon Index uses aggregate census data to
estimate material and social deprivation at the level of the dissemi-
 nation area, the smallest census geographic unit in Canada. The index
was calculated using data from the 2006 Canadian census, the most re-
cently available census. Both material and social deprivation scores
were divided into quintiles to stay consistent with previous literature
[22]. Because we were interested in neighborhood deprivation, we
compared the most deprived areas (4th and 5th quintiles) with the
least deprived areas (1st to 3rd quintiles). The items in the Pampalon
Index have good content validity [30]. The Pampalon index has been
successfully used in several studies, including the DHS study sample
[22].

Individual-level covariates

Based on our literature review, we selected variables that could
confound the relationship between neighborhood selection and dia-
betes distress. We included socio-demographic information on sex, age,
marital status, highest attained education (less than secondary school,
secondary school graduation, some post-secondary school), working
status (working, not working, retired) and family income ($<15,000,
$15,000–$50,000, $50,000–$75,000, $75,000–$100,000), as well as information on number of
chronic conditions (0, 1, >1) and duration of diabetes (in years).
Race was not included because the majority of the sample was non-
Hispanic Caucasian (94%).

Statistical analysis

Because many of the neighborhood items were highly correlated,
their full inclusion in the model could lead to unstable estimates. We
therefore performed a factor analysis to combine the neighborhood
questionnaire items into a few meaningful constructs. Factor analysis is
a method to examine the structure of items by identifying the smallest
number of factors explaining the relationship among observed variables.
We conducted the analysis using a principal component analysis with an
orthogonal varimax rotation. Because of potential for central tendency
bias and response set bias and because of small cell sizes for many of
the extreme answer categories, we dichotomized the categorical
responses of neighborhood items (strongly agree/agree vs strongly
disagree/disagree; excellent/very good/good vs fair/poor). We used
smoothed tetrachoric correlation matrices. The number of retained
factors was based on the scree plot and interpretability of factors. A sum-
mary score for each neighborhood factor was calculated by summing the
items related to each of the factors. We allowed for up to one missing
item response per factor by replacing the missing value with the mean
score of the other non-missing items. Some items were reverse-coded
such that a higher score could be interpreted as better neighborhood
qualities.

We performed linear regressions for each neighborhood construct. We
used log transformed diabetes distress scores as the dependent
variable because continuous scores were highly skewed. We reported
the beta coefficient of each neighborhood construct for 3 models:
1) model 1 adjusted for age and sex only; 2) model 2 adjusted for
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