

## Development of a New Fear of Hypoglycemia Scale: FH-15

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Hypoglycemia is the most common adverse event associated with insulin treatment in diabetes. The consequences of hypoglycemia can be quite aversive and potentially life threatening. The physical sequelae provide ample reason for patients to fear hypoglycemia and avoid episodes. For these reasons, our purpose in this study was to develop a new measure that explores specific fear of hypoglycemia (FH) in adult patients with type 1 diabetes and to examine its psychometric properties. The instrument developed to assess FH was initially made up of 20 items, of which 18 were negative and 2 were positive, assessed on a 5-point Likert scale (1–5). This scale was completed by 229 patients with type 1 diabetes. Additionally, a structured interview and a closed question called subjective fear of hypoglycemia were included as diagnostic criteria. A factor analysis employing the principal-components method and promax rotation was carried out, resulting in a new scale composed of 15 items. Three factors (fear, avoidance, and interference) were obtained and explained 58.27% of the variance. The scale showed good internal consistency (Cronbach's  $\alpha = .891$ ) and test-retest reliability ( $r = .908, p < .001$ ), as well as adequate concurrent and predictive validity. The cutoff score that provided the highest overall sensitivity and specificity was set at 28 points. The Fear of Hypoglycemia 15-item scale (FH-15) demonstrated good reliability and validity. This study suggests that the new instrument may serve as a valuable measure of specific FH for use in research and clinical practice.

*Keywords:* hypoglycemia, fear, type 1 diabetes, assessment

Type 1 diabetes mellitus is a chronic disease that requires optimal control of glucose levels, for which patients must perform self-monitoring of blood glucose levels several times per day. Glycosylated hemoglobin (HbA<sub>1c</sub>) enables assessment of glycemic control in patients. According to the American Diabetes Association (2010), HbA<sub>1c</sub> must be no more than 7% to be optimal. Nonetheless, correct glycemic control gives the

patient a delicate equilibrium between maintaining normoglycemic levels and avoiding hypoglycemia, because, as revealed in the Diabetes Control and Complications Trial (Diabetes Control and Complications Trial Research Group, 1997), the cost of maintaining HbA<sub>1c</sub> within the recommended limits through intensive insulin treatment implies an increase in the incidence of hypoglycemia. Strict glycemic control produced a

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This article was published Online First March 7, 2011.

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This research was supported by funding from the Ministry of Science and Innovation for project SEJ2007-63786/PSIC and within the framework of CIBER (Biomedical Research Center Network) on diabetes and associated metabolic diseases.

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threefold increase in hypoglycemic episodes in type 1 diabetes patients. Similar results were found in patients with type 2 diabetes in the UK Prospective Diabetes Study (UK Prospective Diabetes Study [UKPDS] Group, 1998).

Indeed, hypoglycemia is the most common adverse event associated with insulin treatment in type 1 and type 2 diabetes. It can occur suddenly and is characterized by unpleasant physical and psychological symptoms, such as shaking, sweating, drowsiness, nausea, poor motor coordination, mental confusion, negative mood, and unconsciousness (Wild et al., 2007). Severe hypoglycemia can result in physical injury, automobile accidents, and even death. The Diabetes Control and Complications Trial study (Diabetes Control and Complications Trial Research Group, 1997) reported that in a sample of 817 patients with type 1 diabetes observed over 21 months, 714 severe hypoglycemic episodes occurred in 216 patients. Half of these episodes occurred at night in patients who had received intensive insulin therapy.

Tighter diabetic control is achieved through intensive insulin therapy; however, an unwanted consequence of this therapy is a threefold increase in severe episodes of hypoglycemia, which increases the risk of fear of hypoglycemia (FH). The impact of the relationship between FH and metabolic control has been studied by Irvine, Cox, and Gonder-Frederick (1994). They concluded that high fear in the presence of high risk of hypoglycemia might be adaptive, in that it would promote monitoring of appropriate behaviors to avoid hypoglycemic episodes. However, low fear or denial when risk of hypoglycemia is high or excessive fear when risk is low may lead to maladaptive responses. Therefore, severe hypoglycemia (the patient requires help from others) may result in more fear than does mild hypoglycemia (characterized by blood glucose down 70 mg/dl).

Given the unpleasant aspects of hypoglycemia, especially severe hypoglycemia, patients develop anxiety about a repeat episode. Steps taken to avoid this situation may then be reinforced, as they are associated with a reduction in the person's anxiety (Wild et al., 2007). This avoidance may have significant clinical implications for diabetes management. Wild et al. (2007) reported that in order to avoid the aversive symptoms of past hypoglycemic episodes, patients who have FH may engage in "over-compensatory behaviors" (p. 11), such as taking less insulin than they need or over-eating, to avoid hypoglycemia. According to Wild et al., this type of doping response may result in poor metabolic control and increase the risk of serious health consequences associated with diabetes. In this respect, some research has suggested that FH may promote nonadherence behaviors in order to avoid hypoglycemia, which in turn would affect metabolic control (Beléndez & Hernández-Mijares, 2009).

People with diabetes who have a history of past severe hypoglycemic episodes are often those patients with more severe diabetes and increased FH (Gold, Frier, MacLeod, & Deary, 1997). Appropriate disease management is especially critical for these patients.

Nonetheless, a review of the relevant literature indicates that only one scale (Hypoglycaemic Fear Scale; HFS) has been widely employed in the assessment of FH in adults. Although the HFS (Irvine et al., 1994) is the most widely used measure of FH with good psychometric properties, some aspects of the scale might be considered. For instance, this scale is composed

of Behavior and Worry subscales. The Behavior subscale is composed of behavior and avoidance items, and the Worry subscale is made up of worry and fear items. Yet, the HFS is not very specific for assessing FH, due to the fact that the Worry subscale measures concern more than fear. For example, items include "not having food, fruit, or juice with me" and "embarrassing myself or my friends in a social situation." Moreover, the HFS has been used in patients with type 1 and type 2 diabetes. Although some patients with type 2 diabetes are treated with insulin, most do not require this type of treatment. In addition, patients with type 2 diabetes who are insulin dependent feel worse than other type 2 diabetes patients. The differential characteristics between the types of patients should also be considered, because both the effects of the impact of diagnosis and the progression of the disease are different.

Furthermore, D. J. Cox noted (as cited in Polonsky, Davis, Jacobson, & Andersson, 1992) that the HFS-B might not faithfully represent FH, because many items describe quite reasonable actions that do not appear to be related necessarily to hypoglycemic fear. In addition, previous studies using the HFS have found lower internal consistency for the Behavior subscale (Clarke, Gonder-Frederick, Snyder, & Cox, 1998; Cox, Irvine, Gonder-Frederick, Nowacek, & Butterfield, 1987). It is possible that this may be a weakness of the original scale: The items of the Behavior subscale involve less subjective interpretation, as they are meant to measure behaviors related to preventing an episode of hypoglycemia rather than fear related to hypoglycemia (Cox et al., 1987).

Hence, the development of a new measure that explores specific FH in patients with type 1 diabetes seems reasonable. This measure has the advantage of being a short (15-item), specific tool for evaluating FH. It can therefore be used in doctors' offices, where such patients are seen, in order to detect individuals with a high risk of hypoglycemia who demonstrate high levels of fear, as well as individuals with a high risk for hypoglycemia who demonstrate low levels of fear. This would enable each patient to receive specific individualized treatment, in such a way that the new tool would contribute to minimizing the physical effects (e.g., chronically high blood glucose levels, greater risk of complications) or psychological effects (e.g., phobia, uneasiness) that FH produces in this type of patient. Given that we hope to find a reliable and valid measure for the assessment of fear and hypoglycemia in these patients, the new tool could also be used in research.

Thus, our purpose in the current study was the development of a new measure that explores specific FH in adult patients with type 1 diabetes. Data focusing on the factor structure of the new Fear of Hypoglycemia scale, internal consistency, test-retest reliability, and convergent validity are presented below.

## Method

### Participants

Two hundred and fifty patients with type 1 diabetes mellitus were invited to participate in this study. All 229 patients who agreed to participate were from the Diabetes Unit of the Endocrinology Department at Carlos Haya Regional University Hospital in Malaga. The characteristics of the sample are shown in Table 1.

Table 1  
*Demographic Characteristics*

Variable	<i>M</i>	<i>SD</i>	%
Age, years			
Age of participants	34.60	11.02	
Age at diagnosis of diabetes	18.48	10.47	
Time with diabetes, years	16.11	10.05	
Sex			
Male			42.36
Female			57.64
Marital status			
Single			44.5
Married			47.2
Separated			3.1
Divorced			3.5
Widowed			1.3
Educational level			
Basic knowledge (reading and writing)			2.6
Primary school studies			35.8
High school studies			21.8
Vocational training			10
Undergraduate degree			13.1
Graduate degree			16.6
Occupation			54.6
Employed			15.7
Unemployed			14.8
Students			7
Housewives			4.4
Retired			3.5
On sick leave			
Hypoglycemic episodes (aware)			
Every day			5.68
Almost always			13.97
Sometimes			61.57
Rarely			18.34
Never			0.44
Severe hypoglycemic episodes (not aware)			
Every day			0.44
Almost always			0.44
Sometimes			6.55
Rarely			31
Never			61.57

Note. *N* = 229.

## Procedures

The sample was recruited during the first trimester of 2009 by a clinical psychologist. Patients participated voluntarily and completed the questionnaire after signing the informed consent. Participants were not compensated for their time.

First, the sociodemographic variables of the patient (e.g., age, sex, marital status, number of children, education level, occupation, duration of diabetes) were collected through a structured interview conducted by a clinical psychologist in an examination room of the diabetes unit during a visit to the endocrinologist. Participants were allowed to ask the clinical psychologist questions about scale items.

Second, the patients completed the 15-item Fear of Hypoglycemia scale (FH-15). The new instrument developed to assess FH was initially made up of 20 items (see Appendix A), of which 18 were negative and 2 were positive, assessed on a 5-point Likert scale with a range of 1–5. The items were collected based on the knowledge of experts (endocrinologists and psychologists special-

izing in clinical psychology) in the field of diabetes. The original 20-item Fear of Hypoglycemia scale demonstrated good internal consistency ( $\alpha = .874$ ).

Third, the patient's subjective perception of FH was assessed by a question. This question was presented in written form together with the FH-15 questionnaire and was asked as follows: "Are you afraid of suffering from hypoglycemia?" This was a closed question, and the possible answers were "yes" or "no." This question, called subjective fear of hypoglycemia, has been used as a diagnostic criterion (gold standard).

All 229 patients who participated in this study responded to the questions included in the sociodemographic interview and also to the question subjective fear of hypoglycemia. Next, they completed the 20 initial items of the FH-15 scale. The questionnaire was given a second time, 20 days after the initial assessment, to a random sample of 42 patients in order to analyze test–retest reliability.

## Data Analysis

All statistical procedures were performed with SPSS Version 16.0. Hypothesis testing was carried out at a 95% confidence level.

We used exploratory factor analysis (EFA) to analyze the structure and construct validity of the new scale. The Kaiser–Meyer–Olkin (KMO) sampling adequacy index and Bartlett's sphericity test were used to determine the appropriateness of factor analysis in this case. After suitability was confirmed, the principal-components extraction method and promax rotation, which is an oblique rotation for nonorthogonal factors, were used. The rule of eigenvalues greater than one was employed to select the number of factors (i.e., use as many factors as there are correlation matrix eigenvalues greater than one). An item was said to associate with the factor for which it had the largest loading.

Using subjective fear as a criterion, we established the cutoff score for the scale using receiver-operating characteristic (ROC) analysis, based on Youden's index.<sup>1</sup> The ROC curve was constructed after considering all possible classifiers. We used the area under the ROC curve (AUC index) as a measure for the global precision of the tool.

Concurrent-criterion-related validity of the scale was measured by comparing the mean scores between the group that reported fear and the group that did not. This comparison was carried out with Student's *t* test, given that the groups were of similar size. For predictive-criterion-related validity, false negatives and false positives were determined, as were positive predictive value (PPV) and negative predictive value (NPV). PPV and NPV are based on prevalence. PPV is the probability that a person providing a positive response on the test truly has FH, and NPV is the prob-

<sup>1</sup> Youden's index ( $J = Se + Sp - 1$ ) oscillates between 0 and 1 and measures the overall suitability of a classifier, reaching a higher value for those classifiers presenting higher overall sensitivity and specificity. The area under the ROC curve (AUC) index is a measure of the overall precision of the ROC curve. Youden's index (*J*) is a function of sensitivity (*Se*) and specificity (*Sp*), which is a commonly used measure of overall diagnostic effectiveness in a two-dimensional case. Values close to 1 indicate a greater sensitivity and specificity together and, therefore, a lower proportion of false positive or negative rates for the classifier (or cutoff) selected.

ability that a person with a negative result on the test does not really have a fear of experiencing hypoglycemia. Internal consistency of the scale was assessed with Cronbach's alpha coefficient, and test-retest reliability was assessed with Pearson's correlation coefficient.

Finally, a comparison of the differences in means in the scale scores was made, based on whether or not the patient had experienced complications associated with diabetes, had other chronic diseases, was aware of hypoglycemia, and had needed help to overcome a hypoglycemic episode in the 6 months prior to completing the questionnaire. For this comparison, a Student's *t* test was employed at a 95% confidence level.

### Results

Through factor analysis, employing the principal-components method and promax rotation, a five-factor solution was extracted. The five factors accounted for 58.93% of the total variance. The items from the two final factors (Items 1, 2, 8, 9, 10) were eliminated, due to low correlations (less than .40) both with the total scale and with the other factors, resulting in a shortened scale with 15 negative items (see Appendix B).

### Construct Validity

EFA was performed on the new 15-item scale (FH-15). KMO was .897, and the hypothesis that the correlation matrix was an identity matrix was rejected with Bartlett's test,  $\chi^2(105) = 1,356.144, p < .001$ . The rotated solution (see Table 2) was made up of three factors (fear, avoidance, and interference) that accounted for 58.27% of the common variance of the 15 items analyzed. In fact, the three factors obtained were correlated with each other (see Table 3).

Table 3  
*Correlation Matrix Between Factors*

Factor	1	2	3
1. Fear	—	.509	.495
2. Avoidance		—	.538
3. Interference			—

### Reliability

The FH-15 showed adequate internal consistency ( $\alpha = .891$ ). Item-scale correlations were moderate to moderately high (see Table 4) in all cases. The deletion of any scale item involves a decrease in Cronbach's alpha value. Each of the three factors (fear, avoidance, and interference) showed acceptable internal consistency, with Cronbach's alpha values greater than .75. The FH-15 scale had adequate test-retest reliability ( $r = .908, p < .001$ ).

### Cutoff Score

The items in the FH-15 scale differentiated patients on the basis of the criterion (subjective FH) almost perfectly, at a higher than 99% confidence level. Therefore, the patients who had FH, according to the subjective criterion, scored higher on each of the scale items than did the rest of the patients (who subjectively did not have fear). The AUC was .858. The significance probability corresponding to this index was  $p < .001$ , which indicated that the curve moved significantly away from the diagonal and therefore differentiated between the two groups we created based on the answer to the question on subjective fear. A cutoff score of 28 points for the FH-15 scale was obtained with the Youden index (.543). Therefore, accord-

Table 2  
*Factor Loadings of the Items of the FH-15 Scale, After Application of Promax Rotation*

How often . . .	Subscales		
	Fear	Avoidance	Interference
<b>Fear</b>			
Are you afraid of having hypoglycemia while you are alone?	<b>.878</b>	-.057	-.049
Do you fear not recognizing the symptoms of hypoglycemia?	<b>.811</b>	-.184	.087
Do you worry about losing consciousness due to hypoglycemia?	<b>.794</b>	-.128	.008
Are you afraid of falling asleep for fear of having hypoglycemia at night?	<b>.658</b>	.027	.019
Are you afraid of having hypoglycemia at work?	<b>.637</b>	.293	-.179
Are you afraid of having hypoglycemia outside of a health care setting?	<b>.546</b>	.161	.046
Are you afraid of not knowing what to do in the event of hypoglycemia?	<b>.500</b>	.134	.123
<b>Avoidance</b>			
Do you avoid social situations (meetings, outings, etc.) due to fear of having a hypoglycemic episode?	-.082	<b>.938</b>	-.123
Are you afraid of taking a trip/holiday for fear of experiencing hypoglycemia?	.056	<b>.821</b>	-.058
Do you stop doing things you used to do for fear of having a hypoglycemic episode?	-.040	<b>.793</b>	.075
<b>Interference</b>			
Do you have hypoglycemia that makes you unable to work?	-.047	-.186	<b>.904</b>
Do you have from hypoglycemia that interferes with your family life?	.007	-.048	<b>.823</b>
Do you have from hypoglycemia that makes you unable to drive or use machinery?	.057	.019	<b>.596</b>
Do you have hypoglycemia that interferes with your social life?	.054	.308	<b>.591</b>
Do you have hypoglycemia that interferes with your leisure activities?	-.002	.413	<b>.466</b>

Note. The highest factor loadings for each factor are shown in boldface. FH = fear of hypoglycemia.

Table 4  
Correlation Between the Respective Items and the Total FH-15 Scale

FH-15 scale	Item-total correlation	Cronbach's $\alpha$ if item is eliminated
Item 1	.574	.879
Item 2	.570	.879
Item 3	.587	.879
Item 4	.573	.879
Item 5	.627	.876
Item 6	.497	.882
Item 7	.572	.879
Item 8	.454	.883
Item 9	.435	.884
Item 10	.608	.878
Item 11	.525	.881
Item 12	.675	.875
Item 13	.543	.881
Item 14	.550	.881
Item 15	.578	.879

Note. FH = fear of hypoglycemia.

ing to scores obtained on the scale, individuals with scores equal to or greater than 28 would be classified as having fear of hypoglycemia.

### Criterion Validity

Significant differences were found in the final score on the FH-15 scale between participants who had FH and those who did not,  $t(171.530) = 10.975$ ,  $p < .001$ . The first group presented higher scale scores (see Table 5). So, the concurrent validity of the scale was confirmed.

Based on the sensitivity (.736) and specificity (.807) of the FH-15 scale, the percentages of false negatives and false positives were 26.4% and 19.3%, respectively. The PPV was .779, and the NPV was .768. Both predictive values can be considered acceptable, such that predictive validity is adequate. In both cases, the predictive value (positive and negative) is greater than 75%, a percentage at which test results can be retained. This indicates that the ability to predict whether a person exhibits fear after having been diagnosed with the FH-15 or does not exhibit fear after having been classified as being without FH is adequate.

### Prevalence

With subjective fear used as the criterion, the prevalence of FH in the population was 48%. As measured with the new FH-15 scale, the prevalence of FH was slightly lower (45.4%).

### FH-15 Scale Data

Significant differences existed depending on whether the participant had typical complications of diabetes ( $p = .039$ ) or had other chronic diseases ( $p = .003$ ). There were also differences in the final FH-15 scale score in terms of those who always perceived or never perceived hypoglycemia. Individuals who often perceived hypoglycemia ( $p = .007$ ) had a significantly lower score on the FH-15 scale. There were also significant differences in the final score on the scale (see Table 6)

between patients who had needed help to overcome an episode of hypoglycemia in the 6 months prior to the completion of the questionnaire and those who had not ( $p < .001$ ).

## Discussion

Our purpose in the study was to obtain a scale to quantify FH specifically in patients with type 1 diabetes. The FH-15 would appear to be a reliable and valid instrument for identifying specific FH in patients with type 1 diabetes. The results indicate that the FH-15 has good internal consistency and adequate test-retest reliability. Its construct validity was proven through EFA, which yielded three factors (fear, avoidance, and interference) showing high correlation with the total scale score. The FH-15 scale enables FH to be quantified with a summed 15-item questionnaire. The cutoff score was set at 28 points. Individuals with scores equal to or greater than 28 points will be classified as having FH. With respect to the scale's criterion validity, this was proven upon finding significant differences in the total score between those who experienced FH and those who did not. Furthermore, there was a positive correlation between the total scale score and the dichotomous variable subjective fear, reported directly by the participants when posed the question "Are you afraid of suffering from hypoglycemia?" The individuals who obtained the highest scores on the scale were those who reported subjective fear. In addition, all items were positively correlated with the FH-15 scale.

Thus, the FH-15 scale is a good instrument for the evaluation of FH in adult patients with type 1 diabetes. The FH-15 scale provides a reliable and valid way to detect fear of hypoglycemia. This is important, as FH may promote nonadherence behaviors in order to avoid hypoglycemia that, in turn, would affect metabolic control. The new instrument facilitates the selection of patients in need of psychological intervention (those with scores equal to or greater than 28), with the goal of minimizing the effects of FH on metabolic control and adherence behaviors. Hence, this scale is a good instrument for improving use of medical resources.

The guidelines published by the American Diabetes Association (2010) indicate that "assessment of FH, like other psychological problems, can be made during regularly scheduled management visits when problems with glucose control, quality of life, or adherence are identified, when complications are discovered and when medical status changes" (p. S27). The FH-15 scale could be used to meet these recommendations, as it offers the following advantages:

Table 5  
Scores on the FH-15 Scale for Subjective Fear

FH in patients	Subjective fear			$t(171.530)$
	<i>M</i>	<i>SD</i>	<i>n</i>	
Yes	33.864	9.617	110	10.975*
No	22.353	5.555	119	

Note. FH = fear of hypoglycemia.

\*  $p < .001$ .

Table 6  
Differences Among Survey Participants in Some of the Variables Assessed With the FH-15 Scale

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	<i>t</i> (227)
Typical complications of diabetes				
Yes	30.750	10.456	40	2.081*
No	27.275	9.406	189	
Other chronic diseases				
Yes	30.972	10.934	71	3.313**
No	26.494	8.723	158	
Perceive hypoglycemia				
Always	26.703	9.043	155	-2.708**
Not always	30.351	10.493	74	
Needed help to overcome hypoglycemia in the past 6 months				
Yes	32.255	10.719	55	3.972***
No	26.500	8.901	174	

Note. FH = fear of hypoglycemia.  
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

- Although other instruments assess concern, worry, or both, the FH-15 Fear scale assesses fear of hypoglycemia specifically.
- The FH-15 scale is a specific assessment instrument for adult patients with type 1 diabetes. Nevertheless, it could also be used to avoid hypoglycemia in patients with type 2 diabetes who present poor metabolic control due to low adherence behaviors (especially if they are treated with insulin).
- The FH-15 scale is a short instrument. Thus, it is a tool that is easily and quickly administered, which provides an advantage for its use in clinical research.
- Despite the brevity of this instrument, its benefits are not compromised, as the FH-15 scale enables health care professionals to quickly and precisely determine the concrete fears related to hypoglycemia, as well as their extent.

Indeed, FH is a complex phenomenon, and further research is needed to study its impact on treatment adherence and metabolic control. The FH-15 scale could be used to identify individuals who experience fear of hypoglycemia and require psychological intervention in order to improve adherence behaviors and metabolic control, including those who experience fear but do not manifest it (are at high risk of hypoglycemia but evidence low levels of fear). Its use would enable patients to receive adequate treatment, and specific intervention programs could, thereby, be designed for this type of patient.

Because the consequences of hypoglycemia can be quite aversive and potentially life threatening, it is not surprising that those participants with a poorer health status, who failed to perceive hypoglycemia or needed help to overcome hypoglycemic episodes, scored higher on the FH-15 scale (see Table 6). Although these results cannot be generalized, they do offer useful information for establishing selection criteria for patients who would be candidates for psychological intervention (Cox et al., 2001; Gonder-Frederick, Cox, Kovatchev, Julian, & Clarke, 1997; Green, Fehrer, & Catalan, 2000).

In summary, the FH-15 questionnaire enables the identification of individuals with fear of hypoglycemia who may benefit

from psychological intervention (those with a score equal to or higher than 28). According to our data, intervention is particularly advisable for patients who have diabetes complications or other chronic diseases and those who fail to perceive hypoglycemia or need help to overcome these episodes (see Table 6). The questionnaire may also help to assess the avoidance behaviors practiced by these patients, which arise from fear of suffering a hypoglycemic episode, as well as the level of interference in their lives.

Evaluation of the effectiveness of these programs would determine the savings in health care costs. Future research should pursue this objective, and the FH-15 scale is a reliable, valid, and useful instrument suitable for this goal.

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## Appendix A

### Initial Scale (20 items)

1. How often do you experience hypoglycemia (drops in blood glucose below 60 mg/dl)?
  2. How often do you experience severe hypoglycemia (loss of consciousness)?
  3. How often do you fear not recognizing the symptoms of hypoglycemia?
  4. How often are you afraid of not knowing what to do in the event of hypoglycemia?
  5. How often are you afraid of having hypoglycemia at work?
  6. How often are you afraid of having hypoglycemia outside of a hospital/health care setting?
  7. How often are you afraid of having hypoglycemia while alone?
  8. How often are you alert to any bodily sign that could make you think about hypoglycemia?
  9. How often do you notice you are having a hypoglycemic episode?
  10. Do you know what to do in the event of hypoglycemia?
  11. How often do you avoid social situations (meetings, outings, etc.) due to fear of having a hypoglycemic episode?
  12. How often do you stop doing things you used to do for fear of having a hypoglycemic episode?
  13. How often do you have hypoglycemia that makes you unable to drive or use machinery?
  14. How often you have hypoglycemia that makes you unable to work?
  15. How often do you have hypoglycemia that interferes with your leisure activities?
  16. How often do you have hypoglycemia that interferes with your family life?
  17. How often do you have hypoglycemia that interferes with your social life?
  18. How often do you worry about losing consciousness due to hypoglycemia?
  19. How often are you afraid of falling asleep for fear of having hypoglycemia at night?
  20. How often are you afraid of taking a trip/holiday for fear of experiencing hypoglycemia?
- Response options are 1 (*Never*), 2 (*Almost never*), 3 (*Sometimes*), 4 (*Almost always*), 5 (*Every day*).

(Appendices continue)

## Appendix B

### The FH-15 Scale

1. How often do you fear not recognizing the symptoms of hypoglycemia?
  2. How often are you afraid of not knowing what to do in the event of hypoglycemia?
  3. How often are you afraid of having hypoglycemia at work?
  4. How often are you afraid of having hypoglycemia outside of a hospital/health care setting?
  5. How often are you afraid of having hypoglycemia while alone?
  6. How often do you avoid social situations (meetings, outings, etc.) due to fear of having a hypoglycemic episode?
  7. How often do you stop doing things you used to do for fear of having a hypoglycemic episode?
  8. How often do you have hypoglycemia that makes you unable to drive or use machinery?
  9. How often you have hypoglycemia that makes you unable to work?
  10. How often do you have hypoglycemia that interferes with your leisure activities?
  11. How often do you have hypoglycemia that interferes with your family life?
  12. How often do you have hypoglycemia that interferes with your social life?
  13. How often do you worry about losing consciousness due to hypoglycemia?
  14. How often are you afraid of falling asleep for fear of having hypoglycemia at night?
  15. How often are you afraid of taking a trip/holiday for fear of experiencing hypoglycemia?
- Response options are 1 (*Never*), 2 (*Almost never*), 3 (*Sometimes*), 4 (*Almost always*), 5 (*Every day*).

Received October 6, 2009

Revision received September 7, 2010

Accepted October 4, 2010 ■