

Systematic Review: The Measurement of Health Self-Efficacy to Diabetes

^{1,4}Mohammad Rezal, H., ¹Emma, M., ^{2,4}Julinawati, S., ³Suffian, A. and ⁴Husna, M.Y.

¹School of Media and Communication, The National University of Malaysia, Malaysia

²Department of Nursing and Health Science, School of Science, Athlone Institute of Technology, Ireland

³Universiti Tenaga Nasional, Malaysia

⁴School of Business Innovation and Technopreneurship, Universiti Malaysia Perlis, Malaysia

Abstract: In the context of health, self-efficacy refers to the individual's ability in taking action to attain better health condition. This research is based on past researches by employing the systematic review. The objective of this research is to illustrate the measurement of self-efficacy in the context of health which has been primarily used by other researchers. The scope of this research is mainly in the context of diabetic patients. 14 out of 398 articles has been identified for analytical purposes in tandem with the observed theme; the measurement of self-efficacy employed by the diabetic patients. Almost all researches utilized the model established by Bandura as the basis for measurement. Most of the researches too adapted the Diabetes Management Self-Efficacy Scale (DMSES) as the instrument to identify the level of self-efficacy among diabetic patients.

Key words: Systematic Review, Health, Self-Efficacy, Diabetes, Measurement

INTRODUCTION

Self-efficacy is a concept developed by Bandura (1977, 1986, 1997, 2001) in the Social Cognitive Theory. It provides a meaning concerning human rational in his capacity to administer and execute his actions in order to achieve the targeted result. Although it also concerns individual skills, self-efficacy is leaning towards human rationale in practicing any matters within his capability. This concept also identify in observing the limits of an individual as to how far he could go in order to achieve his goals.

In the context of health, self-efficacy has been widely used to illustrate the capability of a patient or individual which has been diagnosed; to analyze their will and motivation in the ensuing circumstances following the outcome of the health analysis. Apart from that, self-efficacy is also employs to observe the continuous physical therapies and related activities. This also indicates that any changes in the individual behaviour towards his health (Schwarzer, 2008), or an attempt to ensure the sustainability of health status, as well as the duration take to achieve such status could also be part of self-efficacy (Ziegelmann, 2007).

The acceptance of self-efficacy as a measurement in the behavioural change processes is significant in the context of health at various levels. As a matter of fact, this has further elucidated the measurement of the individual behavioural change and the processes involve did not involve the same instrument. It is self-efficacy methods which allow the patients to choose their strength and abilities in charting as well as planning the educational program to assist them in pain management. While each disease acquire a different set of self-efficacy's measurement, the knowledge obtain through the use of self-efficacy will promote a better outcome in determining the quality of life the patients could have; case in point, the level of self-efficacy needed among diabetic patients.

Methodology:

The systematic review is comprehensive method and it synthesize either towards the topic of the research or the inquisition of the research. The importance of deploying the systematic review is that it could further clarify the research question/s as oppose to the traditional review. The past research outcomes could be synthesized based on the researcher's need. In this sense, the synthesize method is required to ensure the researcher is able to make a thorough and quality data. The method used for the systematic review is explained as follows (Khan,2003)

For this research, the systematic review approached was primarily based upon the online articles published via the internet. The researchers had determined the attributes of the research as a guide to obtain the online articles. The keywords used to search for the related articles were self-efficacy, health self-efficacy, diabetes, and the measurement of diabetes self management. The following provide the process flow employed in this research.

Corresponding Author: Mohammad Rezal H. School of Media and Communication, PhD Student at The National University of Malaysia, Malaysia,
Email: mohd.rezal@gmail.com

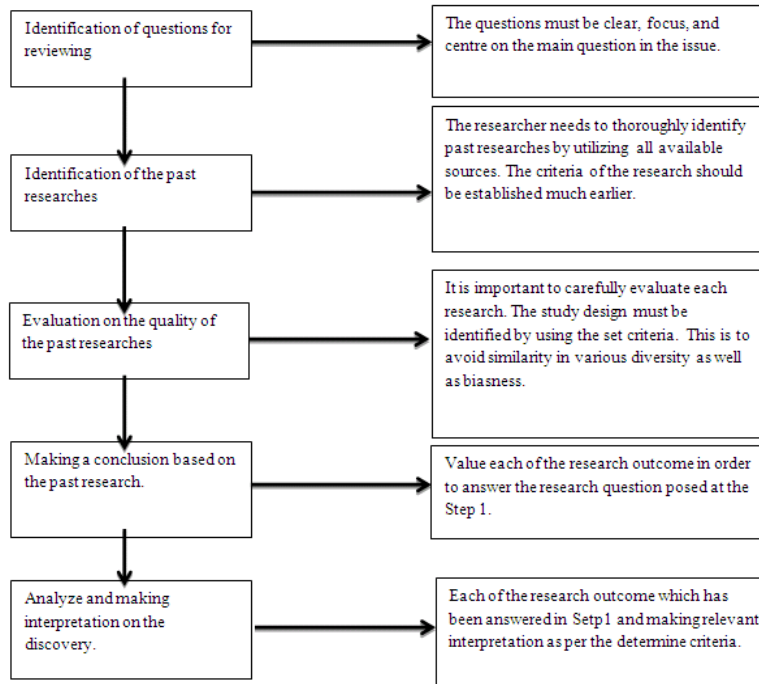


Fig. 1: Process of systematic review Approach.

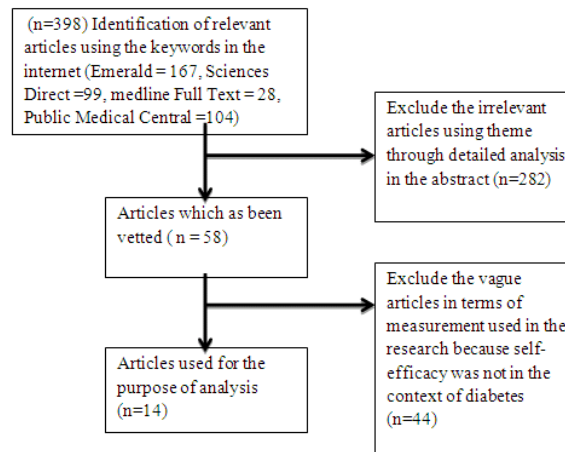


Fig. 2: Selection process for studies included in analysis.

The systematic review approach in this research is further validated using below criteria:

1. Issue: how far the self-efficacy research instrument for diabetic patient has been developed?
2. Type of research: cross-sectional or longitudinal.
3. Type of instruments: scale measurement or questions to measure self-efficacy.
4. Conducting the reliability test and validity.
5. Identify the group of respondents whether they belong to diabetic patient type 1 or type 2.

RESULTS AND DISCUSSION

A total of 398 articles were successfully obtained using the keyword search via the internet. However, upon vetting the abstract of the said articles, only 58 articles were qualified as it focused the theme on self-efficacy research. Meanwhile the remaining articles only touched on self management in the context of diabetic patient. From the total of 58 qualified articles, it has been discovered that 14 articles (refer table 1) had conducted the

research on the measurement of self-efficacy in the context of diabetes and the rest of 44 articles focused on the measurement of self-efficacy in the context of various diseases.

Table 1: Studies Relating Measuring Self-Efficacy to Diabetes.

| Researcher, (year of study) | Name of instrument/ respondent | Domain measurement | Scale measurement |
|--------------------------------------|--|--|--|
| Van der Ven <i>et al.</i> (2003) | Confidence in Diabetes Self-Care (CIDS) scale, | emotional distress, fear of hypoglycemia, self-esteem, anxiety, depression, and self-care behavior. | 5- point Likert scale ranging from 1 (“No, I am sure I cannot”) to 5 (“Yes, I am sure I can”). |
| Roblin, N <i>et al.</i> (2004) | Diabetes Self-Efficacy Questionnaire (DSEQ) | Managing Social, Emotional and Food-Related Aspects of Diabetes (item 38, 42, 39, 34, 33, 48, 8, 11, 36, 32, 43, 7, 16, 18, 47, 35, and 40) Communicating With Health Professionals and Planning (item 49, 51, 46, 31, 52, 37, 50, and 41) Managing Low Blood Sugars (items 30, 4, 1 and 19). Managing Diabetes Related To Exercise, Blood Glucose And Prevention. (items 17, 6, 5, 2, 13, 22, 45, 10, 25, 44, 14, 28, and 3) Integrating Knowledge And Day To Day Care. (items 15, 23, 9, 20, 21, 24, 29, 26, 27, and 12 Managing insulin (items 53, 54, 55, 56, 57, and 58) | six point Likert scale ranging from ‘never’ to ‘always’. Items are scored using a 6 point scale with “0” as “Never” and “5” as “Always”. |
| Weinger, K. <i>Et al.</i> , (2005) | Self-Care Inventory-revised | diabetes-related distress , self-esteem , self-efficacy , depression , anxiety , and HbA1c. | 5-point scale, ranging from “No, I am sure I cannot” to “Yes, I am sure I can.” |
| Kara, M. <i>Et al.</i> (2006) | Diabetes Management Self-Efficacy Scale 125 patients with type 2 | From Factor analysis Factor 1: Diet+feet control Factor 2: Medical treatment/control Factor 3: Physical exercise | 5-point scale, ranging from “No, I am sure I cannot” to “Yes, I am sure I can.” |
| Bean, D. <i>Et al.</i> (2007) | Multidimensional Diabetes Questionnaire Adapted from Nouwen, Gingras, Talbot, & Bouchard (2003) (259 patients type-2) | Two items assess confidence in following diet, one about testing blood glucose, one about exercise, one about controlling blood glucose and one about following all treatments. | 11-point Likert scale with answers ranging from 0 indicating ‘not at all confident’ to 10 indicating ‘very confident’. |
| Alves Gastal D. <i>Et al.</i> (2007) | Adopted Insulin Management Diabetes Self-Efficacy Scale (IMDSES). 213 individuals. | Diet subscale (items 1, 5,6,7,8,9,10,11) Insulin subscale (items 14,15,16,17,18) General management Subscale (2, 3,4,12, 13,19,20) | 5 point Likert scale |
| Vivienne Wu S.F <i>et al.</i> (2008) | Chinese - Diabetes Management Self-Efficacy Scale (DMSES) C-DMSES (n = 230) Adapted Diabetes Management Self-Efficacy Scale (DMSES) (McDowell, 2005) | Nutrition (items 4, 5, 9,10, 13, 14, 15, 16, 17) Physical exercise and weight (items 6, 8, 11, 12) Medical treatment (items 18, 19, 20) Blood sugar and feet check, (items 1, 2, 3, 7) | 11 point scale ranging from “can’t do at all” (0) to “certain can do” (10). |
| McDowell <i>et al.</i> (2005) | Australia DMSES Adapted the DMSES 120 | 20-item | 11-point scale anchored with ‘Cannot do at all’ (0), ‘Maybe yes/maybe no’ (5) and ‘Certain can do’ (10). |

| | | | |
|--|--|---|--|
| Jackie Sturt <i>et al.</i> (2009) | DMSSES UK (type 2 diabetes) | 1,2 3,4 67910, 11, 1213,16,17,19 20 (5 item seem redundancy) | 0–1 Cannot do at all, 4/5 Maybe yes maybe no, 9/10 Certain can do. |
| M Mishali (2010) | The self efficacy scale (adapted Kavookjian, 2005) | blood glucose self-monitoring, physical activity, diet and oral medication intake. | five-point Likert scale to indicate their level of confidence in their ability to follow the treatment recommendation. |
| Carlos Serrano <i>et al.</i> (2011) | Multidimensional Diabetic Questionnaire (MDQ) Adapted from Talbot <i>et al.</i> (1997) 50 patient Type 2 | Section III Self-efficacy (examples item) How confident are you in your ability to Outcome expectations How important do you think that measuring sugar is for controlling your diabetes? | MQD questionnaire section III answers were evaluated on a 0 to 100 point rating scale, meaning 0 feeling “not confident” and 10 feeling “very confident” |
| Omar Abdulhameed Al-Khawaldeh <i>et al.</i> (2012) | The Diabetes Management Self-Efficacy Scale (DMSSES) 223 with type 2 diabetes Adapted (Van der Bijl, van Poelgeest-Eeltink, & Shortridge-Baggett, 1999) | Management blood glucose level, foot care, medication, diet, and level of physical activity. 1,2,3,4,5,6,7,8,9,10,11,12, 13,14,15,16,17,18,19,20 | from 0 (can't do at all) to 10 (certain can do). |
| G. Urquhart Law <i>et al.</i> (2013) | Dietary Self-Efficacy Scale Adapted from Senecal C. (2000) 203 adolescents with T1D, | Not mention in the article | Scale based on 11-point Likert scales ranging from 0 (not at all confident) to 10 (totally confident). |
| Gill Morrison (2013) | Continuous Subcutaneous Insulin Infusion Adapted from Bandura 2006) 100 individuals who had been converted from multi-dose insulin injections to CSII because of glycaemic instability: 97 had type 1 diabetes; two had type 2 diabetes; | Q1. Operate my pump safely Q2. Effectively count the carbohydrate content of food Q3. Administer bolus insulin in line with the type of food and its carbohydrate value Q4. Check my blood glucose levels at least four times a day Q5. Effectively manage my diabetes when I am more physically active, such as exercising Q6. Effectively manage my diabetes when I am ill Q7. Detect high blood glucose levels in time to correct Q8. Detect low blood glucose levels in time to correct Q9. Appropriately correct a high blood glucose level Q10. Treat a “hypo” correctly Q11. Keep daily records of my blood glucose test results Q12. Decide when it is necessary to contact my doctor Q13. Decide when it is necessary to contact my specialist nurse Q14. Ask my doctor questions about my treatment plan Q15. Ask my specialist nurse questions about my treatment plan Q16. Keep my blood glucose values in the normal range when under stress Q17. Ask my family or relatives to help with my diabetes Q18. Inform colleagues / others of my diabetes if needed Q19. Keep my medical appointments Q20. Exercise two or three times per week Q21. Effectively manage blood glucose | from 0 (cannot do) to 10 (certainly can do); |

| | | | |
|--|--|---|--|
| | | values when eating out Q22. Effectively manage my blood glucose levels when drinking alcohol Q23. Manage my diabetes when travelling Q24. Check my feet for sores and blisters each day Q25. Read and hear about diabetes complications without getting discouraged | |
|--|--|---|--|

From the analysis of the 14 articles which focused on the measurement of self-efficacy, it was discovered that all researchers involved had opted to use variation of domain in their measurement. For example, Van der Ven *et al.* (2003) in his research, he employed the emotional distress, fear of hypoglycemia, self-esteem, anxiety, depression, and self-care behavior. Meanwhile Roblin, (2004) used Managing Social, Emotional and Food-Related Aspects of Diabetes, Communicating With Health Professionals and Planning , Managing Low Blood Sugars, Managing Diabetes Related To Exercise, Blood Glucose And Prevention, Integrating Knowledge and Day to Day Care, and Managing insulin.

Furthermore, almost all measurement resorted to self-efficacy which was developed by Bandura as the basis of theory to develop the research instrument. Nevertheless, it is also noted for the adaptation purposes, there has been slight customization made to suit the culture, environment, and ethnic in certain countries. For example, out of the 14 instruments analyzed, there were 4 countries which utilized the same instrument in measuring the self-efficacy; which is Diabetes Management Self-Efficacy Scale (DMSES) that was originally employed by the Dutch and USA. The same instrument was later customized in China, UK, and Australia. Interestingly, the UK version of DMSES only used 15 items out of 20 which was outlined in table (2). The researchers opined that the exclusion of item 5, 8, 14, 15, and 18 of the UK version provided the same interpretation with the rest of the item; hence the omission.

Table 2: Items Measuring Self-Efficacy to Diabetes.

| Item | Item No. |
|---|----------|
| I am able to check my blood/urine sugar if necessary | 1 |
| I am able to correct my blood sugar when the sugar level is too high | 2 |
| I am able to correct my blood sugar when the blood sugar level is too low; | 3 |
| I am able to choose the correct food; | 4 |
| I am able to keep my weight under control | 6 |
| I am able to examine my feet for cuts | 7 |
| I am able to adjust my eating plan when ill | 9 |
| I am able to follow a healthy eating pattern most of the time | 10 |
| I am able to take more exercise if the doctor advises me to | 11 |
| When taking more exercise I am able to adjust my eating plan | 12 |
| I am able to follow a healthy eating pattern when I am away from home | 13 |
| I am able to follow a healthy eating pattern when I am eating out or at a party | 16 |
| I am able to adjust my eating plan when I am feeling stressed or anxious | 17 |
| I am able to take my medication as prescribed | 19 |
| I am able to adjust my medication when I am ill | 20 |

Source: J. Sturt [2009].

Apart from that, as far as the reliability and validity is concerned, all of the instruments had gone through the reliability and validity test. This is so because the status of reliability and validity of instruments is highly important as it determine the strength of it upon development. The higher the value of reliability and validity of the questionnaire would indicate the principal strength of the gathered data. According to Howard and Henry (1998) stated if the same item being tested few times on the same subject at interval time, the differential in the score or the result would be identical or nearly similar. Therefore, it could be concluded that the reliability is referred to the strength of the measurement. In fact, reliability is a requirement but notwithstanding with the validity alone. Lower result reliability test would mean that it could limit the degree of validity whilst the higher reliability test outcome could not thoroughly determine that higher outcome in the degree of validity. In short, reliability could only provide the strength to emulate the probability concerning the validity (Rossemi *et al.*, 2009). Overall, for this study, all of the research conducted throughout the selected articles had reached higher validity value.

Consequently, the number of item used too was uneven. Past researches have shown that as much as 58 items were used to measure self-efficacy, and the least recorded number of item used was 6. In average, most researches used between 15 and 20 item to measure self-efficacy. Moreover, the selection of item too was not clearly justified in the research. As for the measurement scale, most of the researches opt for the score of 0 to 100. From the selection, it could means that the scale in the instrument is 0 (irrelevant to self / not confident at all / do not practice entirely) to the scale of 10 (relevant to self / very confident / practice entirely).

Table 3: Reliability/Validity of The Instrument.

| Researcher, (year of study) | No. Items/ | (validity/reliability tested) |
|--|----------------------------|--|
| Van der Ven <i>et al.</i> (2003) | 20 | Cronbach's $\alpha = 0.86$ for Dutch patients and 0.90 U.S. patients) |
| Roblin, N <i>et al.</i> (2004) | 58 | Test A Belief 0.373 to 0.813 Test A Action 0.439 to 0.908 Test B Belief 0.381 to 0.737 Test B Action 0.405 to 0.791 |
| Weinger, K. <i>Et al.</i> (2005) | 21 items for self efficacy | Cronbach's coefficient was high (total sample: $\alpha = 0.85$; type 1: $\alpha = 0.84$; type 2: $\alpha = 0.85$) |
| Kara, M. <i>Et al.</i> (2006) | 18 items | Internal consistency of the total scale was coefficient a $\frac{1}{4}$ 0:88, |
| Bean, D. <i>Et al.</i> (2007) | 6 items | Coefficient α was computed, and this was 0.88, |
| Alves Gastal D. <i>Et al.</i> (2007) | 20 items | Cronbach's coefficient Diet subscale (0.83) Insulin subscale (0.92) General management subscale (0.78) |
| Vivienne Wu S.F <i>et al.</i> (2008) | 20 items | Cronbach's α nutrition (.93), physical exercise and weight (.81) medical treatment (.79) blood sugar and feet check (.77) |
| McDowell <i>et al.</i> (2005) | 20-item | Cronbach's alpha coefficient for the DMSES = 0.91. |
| Jackie Sturt <i>at al.</i> (2009) | 15 item | Cronbach's alpha for 15 items 0.89 |
| M Mishali (2010) | Not stated | Oral Medication Intake (0.98) Blood Glucose Self-Monitoring (0.98) Diet Maintenance (0.96) Physical Activity (0.88) |
| Carlos Serrano <i>et al.</i> (2011) | 13 items; | Cronbach's alpha coefficient 0.84 |
| Omar Abdulhameed Al-Khawaldeh <i>et al.</i> (2012) | 20 items | Cronbach's alpha coefficient ($\alpha=0.81$ |
| G. Urquhart Law <i>et al.</i> (2013) | 26-items | Cronbach's alpha was .95 for adolescents and .98 for parents. |
| Gill Morrison (2013) | 25 item | using an inter-rater approach; |

Conclusion and Implication:

In general, the development of the instruments related to the chronic diseases is not many. This could be testified from the 398 articles; only 14 focused on the instrument specifically develop for the diabetic patients. This is in line with the research conducted by Frei (2009) where she employed the systematic review to further analyse the measurement of self-efficacy. It has been ascertained from her study, out of 584 articles / researches only 25 centred on the measurement of self-efficacy for chronic diseases.

With the deployment of the systematic review technique, the measuring tools used to analyse the concept or domain in the research could be effectively studied. This is because the steps taken in the systematic review would allow the future researchers to understand how certain instrument could be developed, to measure the strength and weakness of such instrument, and to enquire which item could be used for the researchers who are weak in the field.

Apart from that, future researchers too would be able to develop the instrument either by adapting or create a new one. Either way it would significantly assist them to comprehend the reliability and validity of the said instrument. Further to that, the reliability and validity of the instrument is the sustenance which determines its usability. As a matter of fact, the existing measurement could also be used by the researcher to probe the duration taken for such instrument to be effectively used. The fact that most researchers only present the internal consistency by opting to use the alpha cronbach value as determinant is less effective as opposed to the technique in test-retest reliability through the intra-class correlation coefficients.

In developing the measurement of self-efficacy, there are 2 issues at hand; whether the future researcher will employ using the existing measurement tool, or develop an entirely new measurement technique which would directly implicate the Bandura's theory because naturally it is the main reference to understand self-efficacy in their research.

In developing the research instrument, particularly if its related to Health and self-efficacy, the selection of item which will be used must factor in the suitability of the future respondents in providing their response from the questionnaire. Among others are the differences in culture even though the respondent has the same characteristic pertaining to the sickness; the terms used to describe the item, the first perception, and the usage of the suitable scale that is based on the target audience and their level of understanding.

The differentiation of the items that has been used by past researchers is the best start as it provides the future researchers with in depth knowledge. This will also allow them to understand the suitability of each item with its usage later in the field work. Moreover, it can also avoid from any error in measuring the self-efficacy.

Ultimately, the systematic review approach is the best method to interpret past researches especially in developing research instrument or measurement tool. This is so because such method is highly relevant as it thoroughly analyses each phase of the instrument. In the context of self-efficacy, most of first world countries such as Australia, United Kingdom, and China accepted the usage of Diabetes Management Self-Efficacy Scale (DMSES) as best practiced model.

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