
Methods of Measuring Quality of Life: Theoretical Aspects and Empirical Evidence from Older Persons at Rajshahi City in Bangladesh

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Abstract: Bangladesh has become an ageing society and is going to increase her older persons. Health condition, quality of life (QOL) and physical functioning are worsen as people age. Due to increasing life expectancies, enhancement of medical and health facilities, modernization, Bangladesh, recently, experiencing the rapid change in demographic transition, as well as the most common challenge, population ageing. This paper presents an organizing framework that assists researchers in the design and validation of formative and reflective measurement models for assessing QOL of older persons. The framework draws from the extant literature, includes both theoretical and empirical considerations, and is illustrated through empirical example for measuring QOL of older persons using data from a project entitled “Quality of Life and Active Ageing of Older persons at Rajshahi City in Bangladesh” conducted at the Department of Population Science and Human Resource Development, University of Rajshahi. This example concern constructs that is fundamental to theory-building in this discipline, and most of the scholars used formative model. In contrast, application of the framework to this example suggests that a reflective measurement model may be more appropriate. These results reinforce the need to justify, both theoretically and empirically, the choice of measurement model for measuring subjective QOL.

Keywords: Formative Model, Older Persons, Quality of Life, Reflective Model

1. Introduction

Bangladesh is experiencing the growing number of older persons and now the country is passing through the third stage of demographic transition [1-3]. The global population aged 60 years or over numbered about 962 million in 2017 more than twice as large as in 1980 when there were 382 million older persons worldwide and it is expected to double in 2050, projected to nearly 2.1 billion, World Population Ageing, 2017. It is also estimated that, the older persons will be more and outnumbered children under age 10 and in 2050 it will outreach over the number of adolescents and youth at

ages 10 to 24. World population ageing 2017: Highlights also projected that, 2/3 of world's population live in the developing countries but it also growing faster than the developed regions. The process of population ageing is most advanced in Europe and in Northern America (20 older persons aged 60+ out of 100 population) in 2017. UN also projected that a number of countries will have higher percentage of aged within 2020, e.g., Japan; 31.1% Singapore; 23.7%, Australia; 21.1%, New-Zealand; 20.2% and Republic of Korea; 18.6% [4].

Projection shows that in 2050, older persons expected to account for 35% of population in Europe, 28% in Northern America, 25% in Latin America and Caribbean, 24% in Asia,

23% in Oceania and 9% in Africa. Developing and less developed region specifically in Asia, Africa, Latin America and the Caribbean over 50% older persons are co-resided with their children whereas developed region specifically in Europe and Northern America, only near 20% older persons were co-resided with their children. Across the 143 countries proportion of independent older persons who live alone or with only spouse varied widely ranging from a low percent in Afghanistan (2.3%) to a high percent in Netherlands (93.4%) [5].

Bangladesh is the eighth largest (164.7 million in 2017) and one of the most densely populated country (1176 person per sq. km. in 2015) has started to experience another emerging issue of population ageing in its highly vulnerable population and development context and the number of older persons aged 60 and above in this country is increased from 1.9 million (in 1974) to approximately 13 million (in 2019) which is 8% of the total population [6]. The latest population census of Bangladesh showed that 7.4% of its population is older [7]. This percentage of population provided the projected percentage of older population is to increase 8.0% in 2020, 11.9% in 2035 and 17.0% in 2050. The increase in older population in Bangladesh during the period 1990 to 2025 is projected to much faster (219%) than any European countries such as Sweden (33%), UK (45%) or Germany (66%) which seems quite alarming for a developing country that still fighting for poverty. The median age of Bangladeshi population is projected to increase by about 15 years during the period between 2000 and 2050. For Bangladesh, the ageing index i.e. the ratio of the people aged 60 or over to children under 15 years of age will be about 5.7 times higher during the period between 2000 and 2050 due to the growing number of older persons and reduction of young population. Also the old-age dependent ratio will be almost triple in Bangladesh during the period between 2000 and 2050. The demographic transition of Bangladesh is improving as modernized and accessible health or medical facilities to all kind of people and awareness of chronic disease increases.

Furthermore, the perceived Quality of Life (QOL) of older persons, in other words their subjective well-being, is not only a very vital part of ageing research but also of policy concepts like those in the WHO's policy framework of QOL.

The growing number of the aged population and change in the population age structure coupled with change in life style and values of the young and tendency to decline traditional family support system, the older population has emerged as a vulnerable group in the society. As a critical component of QOL, life satisfaction has received wide attention in social science research [8-12]. There have been two major approaches to conceptualizing life satisfaction: the so-called "top-down" and "bottom-up" approaches [9]. The top-down approach assumes that global satisfaction is a pre-dispositional trait or personality which influences one's evaluation of satisfaction in various areas of life. The bottom-up approach, on the other hand, conceptualizes global satisfaction as being influenced by one's evaluation of satisfaction in various life domains [9]. These two distinct

approaches parallel the reflective-indicator and formative-indicator measurement models [13]. Although many popular life satisfaction measures follow the reflective-indicator model, life satisfaction can also be measured by combining satisfaction evaluations across discrete life domains which coincide with the bottom-up approach as well as the formative-indicator model [8, 14, 15]. However, it has long been observed that the correlation between life satisfaction or QOL measures using the reflective-indicator model and the formative-indicator model is far from perfect [8, 16-20]. One factor that may contribute to the discrepancy in correlation between QOL measures based on the two different measurement approaches has to do with the concept of valence, or the potential inter-person differences in perceived importance of different life domains. For QOL measures based on the formative-indicator model, it has been a common practice to use a simple sum of satisfaction scores across various life domains to represent one's global life satisfaction [7, 21, 22]. This summed-domains practice does not take into account the potential inter-person differences in perceived importance of different life domains. Researchers have long noted the possibility of differential importance of different life domains in the overall picture of QOL [8, 23]. Different terms have been used to reflect the concept, such as (the most popular one) "domain importance", "value priority", and "psychological centrality" [8, 23, 24].

Although there appears to be a consensus that domain importance is important, debates over the need to incorporate domain importance, otherwise known as importance weighting, into measures of global life satisfaction remain [8, 18, 20, 25-30].

A formative or causal index results where causality flows in the opposite direction, from the indicator to the construct [31-33]. Although the reflective view dominates the psychological and management sciences, the formative view is common in economics and sociology.

On the other hand scholars often identify structural relationships among latent, unobserved constructs by statistically relating co-variation between the latent constructs and the observed variables or indicators of the latent constructs [34, 35]. This allows scholars to argue that if variation in an indicator X is associated with variation in a latent construct Y, then exogenous interventions that change Y can be detected in the indicator X. Most scholars assume this relationship between construct and indicator is reflective. In other words, the change in X reflects the change in the latent construct Y. With reflective (or effect) measurement models, causality flows from the latent construct to the indicator. However, not all latent constructs are entities that are measurable with a battery of positively correlated items [13, 33, 36]. A less common, but equally plausible approach is to combine a number of indicators to form a construct without any assumptions as to the patterns of inter-correlation between these items.

The distinction between formative and reflective measures is important because proper specification of a measurement model is necessary to assign meaningful relationships in the

structural model [37]. Theoretical work in construct validity and structural equation modeling enhances our understanding, however, considerable debate still exists regarding the procedures a working researcher should follow to achieve construct validity [31, 33, 38-44]. This paper is not to repeat or continue this debate. Rather, the authors; takes the middle ground, building on the work of both those who stress theoretical justifications for constructs and those who argue for empirical validation as part of measure development.

This study presents an organizing framework for construct measurement that begins with theoretical justification to define the nature of the focal constructs, and then employs a series of empirical tests to support the causal direction between constructs and their measures. The framework builds on the work of Jarvis and his colleagues who provide a set of decision rules for deciding whether the measurement model should be formative or reflective [45].

However, the framework here differs from Jarvis *et al.*'s decision rules in several respects, most importantly in the procedures proposed and the attention to measurement error.

The major contribution of this paper is to question the common assumption of a reflective measurement model seen in much of the empirical health literature. The validity of this assumption is measured by applying the proposed framework to widely used constructs in the public health literature of QOL. The empirical example is chosen because of the predominance of the reflective modeling approach for these constructs, even though a formative model can be theoretically more appropriate.

In the case of the integration responsiveness framework, the diverse measures of each of the integration and responsiveness pressures are unlikely to be highly inter-correlated as a reflective structure requires.

Reflective and formative method

Constructs can describe the unobservable (i.e. attitudes) and are "verbal surrogates" for the phenomena named by the construct. These are also known as latent variables. Measures are defined as "an observed score gathered through self-report, interview, observation, or some other means" [33]. Measures are quantifiable, for example, an empirical score gathered from a survey instrument. Measures, also called indicators or scale items, can be distinguished as either ones that are influenced by (reflect) or influence (form) latent variables [13]. Measurement model misspecification occurs when researchers do not pay attention to the directional relationship between measures and the construct [46]. Indicators that are influenced by latent variables are called 'effects' indicators. The measurement models that validate these indicators and their latent variables are known as reflective models. Reflective latent variable shows a common latent factor structure with reflective indicators and show that changes in the underlying latent construct are reflected by changes in the indicators. In addition, the indicators are subjected to errors of measurement in the reflective model. Therefore, the measures all represent the underlying construct in a reflective model and are expected to be correlated. Due to the high correlations between the

indicators, the indicators are also interchangeable and dropping an indicator should not alter the conceptual meaning of the construct [45]. The second type of measurement model is called formative. On the contrary, formative composite variable, the indicators influence the construct. These are often called 'causal' indicators and the construct is often termed as a combination variable or composite variable [47, 48]. This means that the measures cause the construct and that the construct is fully derived by its measurement. The measurement error is at the construct level, meaning that part of the construct is not explained by the measures.

The study is generally based on the WHO's Quality of Life (QOL) policy framework to construct a framework model in context of Bangladesh. In Bangladesh, there is no study conducted for measuring method of QOL of older persons. The QOL construct is influenced by several groups of determinants or determinant factors. This study tried to initialize the concept of QOL with methods and important indicator variables, the determinant factors for Bangladesh concentrating on the socio-demographic, economic, health (physical and psychological) and environment surround the older population.

Meanwhile, reflective and formative methods are very popular for measuring QOL. For measuring QOL of older persons in Bangladesh, the better method for measuring the QOL is still not known accurately or little has been known. There was no study on method of measuring of Quality of Life (QOL) in Bangladesh. The QOL can be calculated by both reflective and formative method. But there is no such empirical study for validation of methods for measuring QOL of older persons in Bangladesh.

1.1. Research Questions

From the above discussion there is arising a question that which method is better for measuring the Quality of Life (QOL): formative or reflective?

1.2. Objective of the Study

The objective of this study was to gain knowledge on the methods of measuring QOL of older persons in context of older persons in Bangladesh. The main objective of this study was to investigate the better methods of measuring the Quality of Life (QOL) of older persons in Bangladesh.

2. Methodology

Data

This study used survey data from a project entitled 'Determinant Factors and Level of Quality of Life of Older Persons at Rajshahi City in Bangladesh' conducted at the Department of Population Science and Human Resource Development, University of Rajshahi and the project is supported by the Faculty of Science, University of Rajshahi, Bangladesh. The data collection procedure of the project followed the questionnaire and household survey method.

The survey of the project collected data from older persons (aged 60 years and above) residing at randomly selected five administrative wards (ward no. 3, 7, 12, 26 and 27) of Rajshahi City Corporation in Bangladesh.

The domain and indicator variables of QOL of older

persons have been selected based on the theoretical framework of WHO's QOL model. Theoretical determinants factors of QOL and their corresponding aspects/variables, developed by WHO, are provided in Table 1 and those variables are measurable [49].

Table 1. Domains of Quality of Life with indicator variables.

Domain	Variables
Physical health Domain 1 (D1)	1=physical pain, 2=medical treatment, 3=energy for everyday life, 4=physical ability, 5=satisfaction of sleep, 6=ability of daily activity, 7=working ability.
Psychological Domain 2 (D2)	1=enjoying life, 2=meaningful life, 3=concentration in work, 4=ability of moving body, 5=satisfaction with yourself, 6=negative feeling.
Social Relationship Domain 3 (D3)	1=satisfaction of personal life, 2=satisfaction of married life, 3=satisfaction with support from friends.
Environmental Domain 4 (D4)	1=feeling safety, 2=healthy environment, 3=enough money for removing scarcity, 4=having daily information, 5=scope of leisure activities, 6=satisfaction of living place, 7=satisfaction of health services, 8=satisfaction with transportation.

Source: [World Health Organization (WHO) (1996). The WHOQOL Group. WHOQOL-BREF: field trial version program on mental health. World Health Organization (WHO); Geneva: 1996.].

2.1. A framework for Designing and Validating Formative and Reflective Method

For measuring Quality of Life (QOL) of older persons in Bangladesh which method (formative or reflective) is good is a great concern for researchers. Churchill's procedure with its strict emphasis on exploratory factor analysis, internal consistency and the domain sampling model has been begun to challenge the blind adherence by various Authors [50-53]. Using basic logic and measurement theory of Borsboom and his colleagues argue that the choice of model is dependent upon the ontology invoked by the latent construct [34, 35]. A general procedure provided by Rossiter for scale development extending "accepted" practice by reemphasizing the importance of theoretical considerations [54]. According to Borsboom and Rossiter experts should focus only on theoretical considerations and resist the temptation to conduct empirical tests. On the contrary, Diamantopoulos, Finn and Kayande suggest that not only theoretical but also empirical criteria are essential to design and validate measurement models [42, 43]. Empirical

analyses are main basis for finding content effectiveness, especially to observe mistakes or conceived theories (which are improper). Such as, obtaining a positive relationship when theoretical aspects and common sense recommend a negative relationship would be an apprehension for researchers [43].

This paper follows the attitude which takes a different purpose on empirical assessment and the aspect that assesses the judgment of a formative or reflective assessment model, adopted from the study of Diamantopoulos, Finn and Kayande [42, 43]. To exhaustively capture the necessary theoretical and empirical aspects, the study presents Diamantopoulos, Finn and Kayande's study with an organizing framework for designing and validating formative and reflective models (Tables 2 and Table 3) [42, 43].

Three theoretical considerations, shown in the Table 2, and three empirical considerations, shown in the Table 3, separate reflective methods from formative methods. These considerations are briefly discussed in the following sub-sections.

Table 2. A framework for Assessing Formative and Reflective Methods: Theoretical Considerations.

Considerations	Formative method	Reflective method	Relevant literature
1. Nature of construct	Latent construct is formed Latent constructs is determined as a combination of its indicators	Latent construct is existing Latent construct exists independent of the measures used	[34, 35]
2. Direction of causality between items and latent construct	Causality from items to construct Variation in the construct does not cause variation in the item measures Variation in item measures causes variation in the construct	Causality from construct to items Variation in the construct causes variation in the item measures Variation in item measures does not cause variation in the construct	[13, 33, 45, 54]
3. Characteristics of items used to measure the construct	Items define the construct Items need not share a common theme Items are not interchangeable Adding or dropping an item may change the conceptual domain of the construct	Items are manifested by the construct Items share a common theme Items are interchangeable Adding or dropping an item does not change the conceptual domain of the construct	[45, 54]

Source: Adopted from Finn, A. and Kayande study [43].

2.2. Theoretical Considerations

Three theoretical considerations are important in convincing whether the assessment method is formative or

reflective. These considerations are as follows: (1) the nature of the construct (2) the direction of causality between the indicators and the latent construct and (3) the characteristics

of the indicators used to measure the construct [42] (details are provided in Table 2).

2.2.1. Theoretical Consideration 1: The Nature of the Construct

In a formative model, according to Borsboom and his Colleagues the latent construct is dependent upon a constructivist, operation list or instrumentalist interpretation [34]. Such as, the human development index (HDI) does not occur as an independent entity but it is a composite measure of human development that uses health, education and income indicators for its measurement [55]. Any modification in one or more of these indicators is likely to cause a modification in a country’s HDI score.

In contrast, in a reflective model, the latent construct exists independent of the measures [35, 54]. Typical examples of reflective scenarios include measures of attitudes and personality that are measured by eliciting responses to indicators. Practically all scales in business and related methodological texts on scale development and all literature related to popular life satisfaction measures follow the reflective-indicator model, life satisfaction can also be measured by combining satisfaction evaluations across discrete life domains which coincides with the bottom-up approach as well as the formative-indicator model [14, 15, 56-59].

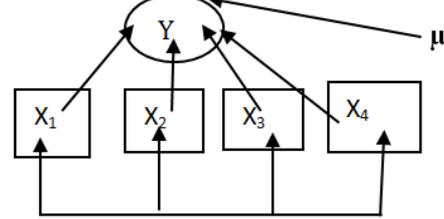
Discussion on constructs of QOL based on the above consideration (Consideration 1):

The level of Quality of Life (LQOL) is a composite measure of Quality of Life (QOL) that includes: physical, psychological, social relationship and environmental domains [49]. According to the WHO’s QOL, the QOL includes 24 variables under which there are four domains [49]. In a formative model, the latent construct is dependent upon a constructivist, operation list or instrumentalist interpretation. For example, for an older person if there added more variables except WHO’s 24 variables which are related to the QOL then the overall QOL of that older person will be changed. Such as, for an older person if educational qualification is added as a variable of QOL then the QOL of that older person may be changed. There is a lack of combination of the variables of the QOL in a formative method when there added more variables except WHO’s recommended variables.

In contrast, in a reflective model, the latent construct exists independent of the measures. For example, for an older person it is difficult to include more variables without WHO’s 24 variables which are related to the QOL. Because the latent construct is independent of the measures. So, there is no lack of combination of the variables of the QOL in a reflective method. From the above discussion it is observed that for measuring QOL reflective method is better than the formative method. Hence from the above discussion of consideration 1 it supports to follow the reflective method for measuring QOL of older persons.

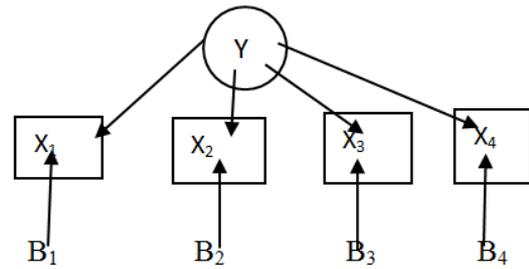
2.2.2. Theoretical Consideration 2: Direction of Causality

Causal Model (Formative indicators)



$$Y = \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \mu$$

Effect Model (Reflective indicators)



$$X_1 = \alpha_1 Y + B_1$$

$$X_2 = \alpha_2 Y + B_2$$

$$X_3 = \alpha_3 Y + B_3$$

$$X_4 = \alpha_4 Y + B_4$$

Figure 1. Formative and reflective Measures.

The second key theoretical consideration in deciding whether the measurement model is formative or reflective is the direction of causality between the construct and the indicators. As shown in Figure 1, formative models assume that causality flows from the indicators to the construct. In the case of reflective models, the reverse is the case, causality flows from the construct to the indicators. Hence, in reflective models, a change in the construct causes a change in the indicators. In the case of formative models, it is the other way around; a change in the indicators results in a change in the construct under study. Thus, the two models in Figure 1 are different, both psychometrically and conceptually [13]. The difference in causal direction has profound implications both for measurement error and model estimation; topics discussed in empirical consideration section [60].

Discussion on constructs of QOL based on the above consideration (Consideration 2):

From the formative and reflective methods it is observed that the direction causality is from indicator to construct and also construct to construct in a formative method. On the contrary, the direction causality is from construct to indicators in a reflective method. In formative method the variation in the construct does not cause variation in the item measures and also variation in item measures causes

variation in the construct. On the other hand, in a reflective method the variation in the construct causes variation in the item measures and also variation in item measures does not cause variation in the construct. For example, if an older person's score of "energy for everyday life" is 1 that mean very poor then there may little variation in the physical domain of that older person. On the other hand, if another older person's score of "energy for everyday life" is 5 that mean very good then there may little variation in the physical domain of that older person. In the same way if an older person's score of "concentration in work" is 1 that mean not at all then there may little variation in the psychological domain of that older person. On the other hand, if another older person's score of "concentration in work" is 5 that mean completely then there may little variation in the psychological domain of that older person. In that way, if an older person's score of "satisfaction with support from friends" is 1 that mean very dissatisfied then there may little variation in the social relationship domain of that older person. On the other hand, if another older person's score of "satisfaction with support from friends" is 5 that mean very satisfied then there may little variation in the social relationship domain of that older person. Similarly, if an older person's score of "enough money for removing scarcity" is 1 that mean not at all then there may little variation in the environmental domain of the older person. On the other hand, if another older person's score of "enough money for removing scarcity" is 5 that mean completely then there may little variation in the environmental domain of the older persons. Finally, if there exists one or more variation in the indicators of physical, psychological, social relationship or environmental constructs then there does not cause more variation in the construct and overall QOL. But if there exists variation in the physical, psychological, social relationship or environmental constructs then there causes variation in the item measures or indicators. From the above discussion it is observed that for measuring QOL reflective method is better than the formative method. Hence from the above discussion of consideration 2 it supports to follow the reflective method for measuring QOL of older persons.

2.2.3. Theoretical Consideration 3: Characteristics of Indicators

Significant differences are present in the characteristics of the indicators that measure the latent constructs under formative and reflective scenarios. In a formative model, since the indicators define the construct, the domain of the construct is sensitive to the number and types of indicators representing the construct. Hence, adding or removing an indicator can change the conceptual domain of the construct. However, as Rossiter points out, this does not mean that we need a census of indicators as Bollen and Lennox suggest [13, 54]. As long as the indicators conceptually represent the domain of interest, they may be considered adequate from the standpoint of empirical prediction.

However, the situation is different in the case of reflective

model; change in the latent variable must precede variation in the indicator (s). Thus, the indicators all share a common theme and are interchangeable. This indicator interchange ability enables researchers to measure the construct by sampling a few relevant indicators underlying the domain of the construct [50, 53]. Inclusion or exclusion of one or more indicators from the domain does not materially alter the content validity of the construct.

Discussion on constructs of QOL based on the above consideration (Consideration 3):

From the formative and reflective methods it is observed that in formative method indicators need not share a common theme, indicators are not interchangeable and by adding or dropping any indicator may change the conceptual domain of the construct. On the contrary, in reflective method indicators share a common theme, indicators are interchangeable and by adding or dropping any indicator does not change the conceptual domain of the construct. In this study, for measuring QOL the indicators share a common theme, indicators are interchangeable and by adding or dropping an indicator does not change the conceptual domain of the construct of QOL. For example, the indicators of physical, psychological, social relationship or environmental constructs of QOL are interchangeable such as the indicators "satisfaction with yourself" and "satisfaction with personal life" are interchangeable between the psychological and social relationship domain construct. Again adding any indicator such as "satisfaction with environment" does not change the environmental domain construct. Similarly by dropping the indicators "negative feeling" or "satisfaction with sleep" do not change the physical or psychological domain construct. From the above discussion it is observed that for measuring QOL reflective method is better than the formative method. Hence from the above discussion of consideration 3 it supports to follow the reflective method for measuring QOL of older persons.

Paralleling the three theoretical considerations above, are three empirical considerations that inform understanding of the measurement model: (1) indicator inter-correlation, (4) indicator relationships with construct antecedents and consequences, and (3) measurement error and colinearity.

Final decision of method selection (formative or reflective) for measuring QOL will be taken after the discussion of three empirical considerations.

3. Empirical Considerations for Method Selection

Along with the three theoretical considerations for method selection, there are three empirical considerations that inform understanding of the measurement model: (1) indicator inter-correlation, (2) indicator relationships with construct antecedents and consequences, and (3) measurement error and colinearity [43] (details are provided in Table 3).

Table 3. A Framework for Assessing Formative and Reflective Methods: Empirical Considerations.

Considerations	Formative model	Reflective model	Relevant literature
1. Item inter-correlation	Items can have any pattern of inter-correlation but should possess the same directional relationship Empirical test: indicator reliability cannot be assessed empirically; various preliminary analyses are useful to check directionality between items and construct	Items should have high positive inter-correlations Empirical test: internal consistency and reliability assessed via Cronbach alpha, average variance extracted, and factor loadings (e.g., from common or confirmatory factor analysis)	[50, 52, 53, 60]
2. Item relationships with construct antecedents and consequences	Items may not have similar significance of relationships with the antecedents/consequences as the construct Empirical test: validity can be assessed empirically, and/or structural linkage with another criterion variable	Items have similar sign and significance of relationships with the antecedents/consequences as the construct Empirical test: content validity is established based on theoretical considerations, and assessed empirically via convergent and discriminate validity	[13, 32, 60]
3. Measurement error and colinearity	Error term cannot be identified if the formative measurement model is estimated in isolation Co linearity should be ruled out by standard diagnostics such as the condition index	Error term in items can be identified Empirical test: common factor analysis can be used to identify and extract out measurement error	[13, 60]

Source: Adopted from Finn, A. and Kayande study [43].

3.1. Empirical Consideration 1: Indicator Inter-correlation

In a formative model, the indicators do not necessarily share the same theme and hence have no preconceived pattern of inter-correlation. Indicators in a formative model can theoretically possess no inter-correlation or high or low inter-correlation. In a reflective model, the indicators are evoked by the underlying construct and have positive and desirably, high inter-correlations. Regardless, researchers should check that indicator inter-correlations are as they expect. Such checks are a necessary part of the various preliminary analyses for questionnaire items administered to samples of respondents. These preliminary analyses include checking for the presence of outliers (e.g., regression influence diagnostics for formative models or using distances in factor spaces for reflective measurement models); checking that the dimensionality of the construct is consistent with a researcher's hypothesis (e.g., using common factor models or principal components analysis); establishing that the correlations between items and constructs have the expected directionality and strength (e.g., through bivariate correlations, factor or regression analysis); reliability statistics (in the case of the reflective measurement model); and, where several constructs are part of a theoretical structure, showing that common method bias is not an issue (e.g., by the absence of one common factor). Some of these preliminary analyses (and the diagnostics that go with them) shed useful light on issues of indicator inter-correlation and inferentially suggest whether one measurement model or another might be preferred. However, in themselves, they cannot either support or disconfirm theoretical expectations as to the nature of the measurement model. For that, researchers require stronger tests.

Since the measures of reliability assume internal consistency—that is, high inter-correlations among the indicators in question—they are inappropriate for formative indicators, where no theoretical assumption is made about inter-item correlation. One of the key operational issues in the use of formative indicators is that no simple, easy and universally accepted criteria exists for assessing the

reliability of formative indicators.

However, as these reflective indicators have positive inter-correlations, measures such as factor loading and communality, Cronbach alpha, average variance extracted and internal consistency are used to empirically assess the individual and composite reliabilities of the indicators [61].

Cronbach's alpha method

Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. A "high" value for alpha does not imply that the measure is one-dimensional. If, in addition to measuring internal consistency, anyone wish to provide evidence that the scale in question is one-dimensional, additional analyses can be performed. Exploratory factor analysis (EFA) is one method of checking dimensionality. Technically speaking, Cronbach's alpha is not a statistical test – it is a coefficient of reliability (or consistency).

Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. Below, for conceptual purposes, it shown the formula for the Cronbach's alpha:

$$\alpha = \frac{N \cdot \bar{c}}{v + (N - 1) \cdot \bar{c}}$$

Here N is equal to the number of items, \bar{c} is the average inter-item covariance among the items and v -bar equals the average variance.

One can see from this formula that if you increase the number of items, you increase Cronbach's alpha. Additionally, if the average inter-item correlation is low, alpha will be low. As the average inter-item correlation increases, Cronbach's alpha increases as well (holding the number of items constant).

Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when anyone has multiple Likert questions in a survey/questionnaire that form a scale and anyone wish to determine if the scale is reliable.

Discussion on constructs of QOL based on the above empirical consideration (Empirical Consideration 1): From the formative and reflective methods it is observed that in a formative method the items can have any pattern of inter-correlation but should possess the same directional relationship. Again the indicator reliability cannot be assessed empirically; various preliminary analyses are useful to check directionality between indicators and domain

construct. On the other hand in a reflective method items should have high positive inter-correlations, internal consistency and reliability assessed via Cronbach alpha, average variance extracted, and factor loadings (e.g., from common or confirmatory factor analysis). In this study from the data the correlations of the indicators of physical, psychological, social relationship and environmental domain constructs are provided in Table 4.

Table 4. Internal consistency among the indicators of different domain constructs of quality of life.

Domain constructs	Cronbach's Alpha value
Physical Domain	0.853
Psychological Domain	0.796
Social Relationship Domain	0.669
Environmental Domain	0.775

From the correlations of the indicators of four domain constructs (physical, psychological, social relationship or environmental) it is observed that the Cronbach's Alpha values are higher for that four domain constructs, so there exists high correlation between the indicators of each of that four domain constructs.

From the above discussion it is observed that for measuring QOL reflective method is better than the formative method. So, from the above discussion of empirical consideration 1 it supports to follow the reflective method for measuring QOL of older persons.

3.2. Empirical Consideration 2: Indicator Relationships with Construct Antecedents and Consequences

In the case of reflective models, the indicators have a similar (positive/negative, significant/non-significant) relationship with the antecedents and consequences of the construct. The requirement for interrelated indicators is not the case for formative indicators as they do not necessarily share a common theme and, therefore, do not have the same types of linkages with the antecedents and consequences of the construct. This requirement is a significant issue when using formative models, particularly as it has implications about the appropriate level of aggregation of formative indicators. While aggregating indicators to create a construct achieves the objective of model

parsimony, it may come at a significant cost in terms of the loss of the rich, diverse and unique information embedded in the individual indicators underlying the theoretical model.

Discussion on constructs of QOL based on the above empirical consideration (Empirical Consideration 2): From the formative and reflective methods it is observed that in a formative method items may not have similar significance of relationships with the antecedents/consequences as the construct and validity can be assessed empirically and structural linkage with another criterion variable. On the contrary, in a reflective method items have similar sign and significance of relationships with the antecedents/consequences as the construct and content validity is established based on theoretical considerations, and assessed empirically via convergent and discriminate validity. In this study, indicators have significance of relationships with the construct and content validity is established based on theoretical considerations for measuring QOL. From the above discussion it is observed that if there exists same sign of factor loadings then the reflective method is better for measuring Quality of Life (QOL). On the contrary, if there exists different sign of factor loadings then the formative method is better for measuring QOL. The decision of empirical consideration 2 can be taken after calculating the factor loadings by using factor analysis.

Table 5. Factors of Quality of Life along with their corresponding indicator variable.

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Physical pain	0.731			
Medical treatment	0.556			
Energy for everyday life	0.706			
Physical ability	0.725			
Ability of daily activity	0.824			
Working ability	0.878			
Enjoying life	0.753			
Concentration in work	0.741			
Ability of moving body	0.744			
Satisfaction with yourself	0.615			
Satisfaction of personal life		0.605		
Satisfaction of married life		0.567		
Satisfaction with support from friends		0.625		
Satisfaction of living place		0.622		
Satisfaction of health services		0.568		
Satisfaction with transportation		0.528		
Meaningful life			0.748	

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Feeling safety			0.597	
Healthy environment			0.631	
Enough money for removing scarcity			0.773	
Having daily information				0.755
Scope of leisure activities				0.545
Eigen Value	8.100	1.627	0.843	0.661
% of variation explained (51.052)	36.819	7.398	3.831	3.004

KMO Measure of Sampling Adequacy=0.921, Chi-square significant at $p < 0.001$.

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

Above Table 5 supports that all factor loadings of all variables of QOL by using factor analysis are in the same sign. So, reflective method is better than formative method for measuring QOL. Hence from the above discussion of empirical consideration 2 it supports to follow the reflective method for measuring QOL of older persons.

3.3. Empirical Consideration 3: Measurement error and Colinearity

A key difference between formative and reflective models is the treatment of measurement error. As shown in Figure 1, an important assumption underlying a correlation structure is not assumed in the case of a formative model that the disturbance term (β_i of figure 1) is not associated with the individual indicator or the set of indicators as a whole and therefore does not represent measurement error [60]. Such as the reflective measurement model is that all error terms (μ_i figure 1) are associated with the observed scores (x_i) and, therefore, represent measurement error in the latent variable.

In the case of formative models, the only way to overcome measurement error is to design it out of the study before collecting the data. Diamantopoulos suggests two possible ways to eliminate the error term: (1) capture all possible causes on the construct, and (2) specify the focal construct in such a way as to capture the full set of indicators [60]. Both approaches legitimately exclude the error term ($\mu=0$). The presence of highly correlated indicators will make estimation of their weights in the formative model difficult and result in imprecise values for these weights. Given a criterion variable, as above, an estimate of the impact of colinearity can be made by regressing the indicators on this variable and computing standard diagnostics such as the condition index. However, in the case of reflective models, researchers can identify and eliminate measurement error for each indicator using common factor analysis because the factor score contains only that part of the indicator that is shared with other indicators, and excludes the error in the items used to compute the scale score [51]. In the light of the above, it is clear that unlike the reflective model, no simple way exists to empirically assess the impact of measurement error in a formative model.

Discussion on constructs of QOL based on the above empirical consideration (Empirical Consideration 3): From the formative and reflective methods it is observed that in a formative method error term cannot be identified if the

formative measurement model is estimated in isolation and colinearity should be ruled out by standard diagnostics such as the condition index. On the contrary in a reflective method error term in items can be identified, common factor analysis can be used to identify and extract out measurement error. In this study, in formative method it is considered that the indicators have effect on the domain construct and overall QOL. On the other hand, in the reflective method there is no extra effect (error terms) of indicators on the domain construct and overall QOL. Hence from the above discussion of consideration 3 it supports to follow the reflective method for measuring QOL of older persons.

According to Diamantopoulos, Finn and Kayande, both theoretical and empirical criteria are necessary to design and validate measurement models [42, 43]. Empirical analyses provide an important foundation for content validity, especially to detect errors and misspecifications or wrongly conceived theories. The study presents an organizing framework for designing and validating formative and reflective models which are described in Table 2 and Table 3. As shown in the Table 2, three theoretical considerations and in Table 3 shown three empirical considerations distinguish reflective models from formative ones and also discussed both method in context three theoretical and three empirical considerations.

From the above six considerations (three theoretical and three empirical), it can be said that reflective method is the best way to measure QOL of older persons in context of Bangladesh. Though formative method is not unsuitable but Diamantopoulos, Finn and Kayande's six considerations prefer reflective method to formative method for measuring QOL of older persons in Bangladesh context [42, 43].

4. Discussion

Following the WHO-1996 framework in this study initially 24 variables were selected from the ongoing project data set both for the males and females in the factor analysis and 2 variables (Satisfaction of sleep and negative feeling) were excluded due to low communalities (i.e, less than 0.20) and low factor loadings (i.e, less than 0.30) and the remaining 22 indicator variables contributed to constitute a structure of four factors. KMO and Bartlett test (KMO Measure of Sampling Adequacy=0.921, Chi-square significant at $p < 0.001$) signify the factor analysis or in other words Exploratory Factor Analysis (EFA) has been justified. The obtained pattern of the factor structure of the Quality of Life is somehow deviate from the WHO-1996 framework.

It explained about 51.052% of total variation. According to the WHO's framework there were four factors namely "Physical Domain", "Psychological Domain", "Social Relationship Domain" and "Environmental Domain". But in this study the factors are deviate from the WHO's framework and the factors are labelled according to their underlying indicator variables namely "Physical Domain", "Personal Domain", "Environmental Domain" and "Informative Domain".

From the above results, it can be said that according to Diamantopoulos, Finn and Kayande, both three theoretical and three empirical criteria are necessary to design and validate measurement models [42, 43]. This study follows the stance of Diamantopoulos, Finn and Kayande but takes a different perspective on empirical measurement and the role that measures play in the choice of a formative or reflective measurement model. From the above six considerations (three theoretical and three empirical), it can be said that reflective method is the best way to measure Quality of Life (QOL) of older persons in context of Bangladesh. Though formative method is not unsuitable but Diamantopoulos, Finn and Kayande's six considerations prefer reflective method than formative method for measuring QOL of older persons in Bangladesh context [42, 43].

The main objective of this study was to investigate the better method of measuring the Quality of Life (QOL) of older persons in Bangladesh. According to Diamantopoulos, Finn and Kayande, both three theoretical and three empirical criteria are necessary to design and validate measurement models [42, 43].

WHO's framework of QOL assume that the correct measurement model for Quality of Life (QOL) is a formative one, whereas there are many instances in which this assumption may not be theoretically or empirically justified [49]. This paper synthesizes previous work and presents an organizing framework for designing and testing measurement models based on both theoretical and empirical considerations derived from extant literature. The authors agree with Borsboom and his colleagues and Rossiter that measurement models must be designed on theoretical considerations [34, 54]. However, we are also in agreement with the work of Bollen and Ting, Diamantopoulos and Winklhofer and others who emphasize that empirical examination is required [13, 32]. As shown in the paper, once the data are collected, it is often useful to know if the assumptions underlying the measurement model hold empirically or not. Of course, it is possible that the reasons for empirical disconfirmation may be due to incorrect instrument design or mistaken responses by the respondents. Another possibility is that the theory underlying the measurement model is incorrect. Since empirical validation is accepted as a norm to validate structural model hypotheses, the same should apply to test the hypotheses about measurement models. So, the research hypothesis is not true that mean there exist difference between formative method and reflective method for measuring QOL of older persons of Bangladesh.

5. Strengths and Limitations

This study has some limitations such as the data come from secondary ongoing project data that focuses on the Active ageing. So the appropriate variables were replaced by some proxy variables that may affect the model and this study based on area based regional data which could not able to generalize the results for whole country. A potential limitation of this study is that the indicators chosen from the literature for our questionnaire items are based on the formative tradition. However, a counter-argument is that such items represent a conservative test of the proposition that reflective measurement is worth considering.

Moreover, this study has some strengths such as, very few of journals are published on the gerontology in the context of social science, in case of QOL and its measuring methods, there is hard to find any journal or paper on the topic. As far as QOL, few articles are found in the policy framework. The significance revealed that this study would help researchers to know the better method for estimating the QOL of older persons. This study will help researcher of future generation on the other research related to the QOL, its measuring method and other phenomena of older persons.

6. Conclusion

The main objective of this study was to compare methods of measuring Quality of Life of older persons of Rajshahi City, Bangladesh. According to Diamantopoulos, Finn and Kayande, both three theoretical and three empirical criteria are necessary to design and validate measurement models [42, 43]. This study follows the stance of Diamantopoulos, Finn and Kayande but takes a different perspective on empirical measurement and the role that measures play in the choice of a formative or reflective measurement model [42, 43]. From the discussion of six considerations (three theoretical and three empirical), it can be said that reflective method is the best way to measure QOL of older persons in context of Bangladesh. Though formative method is not unsuitable but Diamantopoulos and Finn and Kayande's six considerations prefer reflective method to formative method for measuring QOL of older persons in the study area [42, 43]. By using reflective method the study found four factors of Quality of Life in Rajshahi City.

In this study, both theoretical and empirical considerations suggest that reflective model is more plausible than formative ones. The main contribution of this paper was to show the need for researchers to explicitly justify their choice of reflective or formative measurement models by providing the supporting theoretical arguments and empirical corroboration.

Ethical Considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been

completely observed by the authors.

Conflict of Interest

Authors have declared that they have no conflict of interests.

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References

- [1] Uddin MT, Islam MN, Kabir A (2012). *Demographic Dependency of Aging Process in Bangladesh*. *Pakistan Academy of Science*. 49 (3): 209-18.
- [2] Khanam AM, Streatfield KP, Kabir NZ (2011). Prevalence and pattern of multi-morbidity among the elderly people in rural Bangladesh: A cross sectional study. *Journal of Health, Population, and Nutrition*. 29 (4): 406-14.
- [3] Hossain MR (2005). Ageing in Bangladesh and its population projections. *Pakistan journal of social science*. 3 (1): 62-67.
- [4] United Nations [UN]. *Reports on World Population Ageing 2013*. New York; USA: Department of economics and social welfare, United Nations, 2013.
- [5] Sustainable Development Goals [SDGs]. *Monitoring health for the SDGs 2017*. Geneva: World Health Organization.
- [6] Population Reference Bureau [PRB]. *Reports on World Population Ageing 2017*. Dhaka: Statistical Division, Ministry of Planning, 2017.
- [7] Bangladesh Bureau of Statistics [BBS]. *National census report 2011*. Dhaka: Statistical Division, Bangladesh population census, 2011.
- [8] Campbell A, Converse PE, Rogers WL (1976). *The Quality of American Life: Perceptions, Evaluations and Satisfactions*. New York: Russel Sage.
- [9] Diener E (1984). 'Subjective well-being', *Psychological Bulletin*. 95: 542-575.
- [10] Feist GJ, Bodner T E, Jacobs JF, Miles M, Tan V (1995). Integrating top-down and bottom-up structural models of subjective well-being: A longitudinal investigation. *Journal of Personality and Social Psychology*. 68: 138-150.
- [11] George LK, Bearon LB (1980). *Quality of Life in Older Persons: Meaning and Measurements*. New York: Human Sciences Press.
- [12] Myers DG, Diener E (1995). Who is happy? *Psychological Science*. 6: 11-19.
- [13] Bollen KA, Lennox R (1991). Conventional wisdom in measurement: a structural equation perspective. *Psychological Bulletin*. 110 (2): 305-314.
- [14] Neugarten B, Havighurst R, Tobin S (1961). The measurement of life satisfaction. New York: *Journal of Gerontology*. 16: 134-143.
- [15] Diener E, Emmons RA, Larsen RJ, Griffin S (1985). The satisfaction with life scale. *Journal of Personality Assessment*. 49: 71-74.
- [16] Cummins RA (1995). On the tale of gold standard for life satisfaction. *Social Indicators Research*. 35: 179-200.
- [17] Cummins RA (1996). The domains of life satisfaction: An attempt to order chaos. *Social Indicators Research*. 38: 303-328.
- [18] Hsieh CM (2003). Counting importance: The case of life satisfaction and relative domain importance. *Social Indicators Research*. 61: 227-240.
- [19] Russell LB, Hubley AM (2005). Importance ratings and weighting: Old concerns and new perspectives. *International Journal of Testing*. 5: 105-130.
- [20] Russell LB, Hubley AM, Palepu A, Zumbo BD (2006). Does weighting capture what's important? Revisiting subjective importance weighting with a quality of life measure. *Social Indicators Research*. 75: 146-167.
- [21] Beatty P, Tuch SA (1997). Race and life Satisfaction in the middle class. *Sociological Spectrum*. 17: 71-90.
- [22] Mookherjee HN (1992). Perceptions of well-being by metropolitan and nonmetropolitan populations in the United States. *Journal of Social Psychology*. 132: 513-524.
- [23] Inglehart R (1978). Value priorities, life satisfaction, and political dissatisfaction among western publics. *Comparative Studies in Sociology*. 1: 173-202.
- [24] Ryff CD, Essex MJ (1992). The interpretation of life experience and well-being: The sample case of relocation. *Psychology and Aging*. 7: 507-517.
- [25] Mastekaasa A (1984). Multiplicative and additive models of job and life satisfaction. *Social Indicators Research*. 14: 141-163.
- [26] Wu CH (2008) b. Can we weight satisfaction score with importance ranks across life domains? *Social Indicators Research*. 86: 468-480.
- [27] Wu CH, YaoG (2006) a. Do we need to weight satisfaction scores with importance ratings in measuring quality of life? *Social Indicators Research*. 78: 305-326.
- [28] Wu CH, YaoG (2007). Examining the relationship between global and domain measures of quality of life by three factor structure models. *Social Indicators Research*. 84: 189-202.
- [29] WuCH (2008) a. Examining the appropriateness of importance weighting on satisfaction score from range-of-affect hypothesis: Hierarchical linear modeling for within-subject data. *Social Indicators Research*. 86: 101-111.

- [30] WuCH, Yao G (2006) b. Do we need to weight item satisfaction by item importance? A perspective from Locke's range-of-affect hypothesis. *Social Indicators Research*. 79: 485-502.
- [31] Blalock HM (1964). Causal Inferences in Nonexperimental Research. Chapel Hill, NC: University of North Carolina Press.
- [32] Diamantopoulos A, Winklhofer HM (2001). Index construction with formative indicators: an alternative to scale development. *Journal of Marketing Research*. 38 (5): 269-277.
- [33] Edwards J, Bagozzi R (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods*. 5 (2): 155-174.
- [34] Borsboom D, Mellenbergh GJ, Heerden JV (2003). The theoretical status of latent variables. *Psychological Review*. 110 (2): 203-219.
- [35] Borsboom D, Mellenbergh GJ, Heerden JV (2004). The concept of validity. *Psychological Review*. 111 (4): 1061-1071.
- [36] Fornell C A (1982). Second Generation of Multivariate Analysis. New York: Praeger.
- [37] Anderson JC, Gerbing DW (1998). Structural equation modeling in practice: a review and recommended two step approach. *Psychological Bulletin*. 103 (3): 411-423.
- [38] DeVillis RF (1991). Scale Development: Theories and Applications. Newbury Park, California: Sage.
- [39] Baumgartner H, Homburg C (1996). Applications of structural equation modeling in marketing and consumer research: a review. *International Journal of Research in Marketing*. 13 (2): 139-161.
- [40] Chin WW, Todd PA (1995). On the use, usefulness, and ease of use of structural equation modeling in MIS research: a note of caution. *MIS Quarterly*. 26 (2/4): 237-246.
- [41] Shook CL, Ketchen DJ Jr, Hult TMG, Kacmar MK (2004). An assessment of the use of structural equation modeling in strategic management research. *Strategic Management Journal*. 25 (4): 397-404.
- [42] Diamantopoulos A (2005). The C-OAR-SE procedure for scale development in marketing: a comment. *International Journal of Research in Marketing*. 22 (1): 1-9.
- [43] Finn A, Kayande U (2005). How fine is C-OAR-SE? A generalizability theory perspective on Rossiter's procedure. *International Journal of Research in Marketing*. 22 (1): 11-21.
- [44] Rossiter JR (2005). Reminder: a horse is a horse. *International Journal of Research in Marketing*. 22 (1): 23-25.
- [45] Jarvis CB, Mackenzie SB, Podsakoff PM (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*. 30 (3): 199-218.
- [46] Chin WW (1998). Issues and opinion on structural equation modelling. *MIS Quarterly*. 22 (1): vii-xvi.
- [47] Maccallum RC, Browne MW (1993). The Use of Causal Indicators in Covariance Structure Models - Some Practical Issues. *Psychological Bulletin*. 114 (3): 533-541.
- [48] MacKenzie SB, Podsakoff PM, Jarvis CB (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*. 90 (4): 710-730.
- [49] World Health Organization (WHO) (1996). The WHOQOL Group. WHOQOL-BREF: field trial version program on mental health. World Health Organization (WHO); Geneva: 1996.
- [50] Churchill GA (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*. 16 (Feb): 64-73.
- [51] Spearman C (1904). General intelligence objectively determined and measured. *American Journal of Psychology*. 15 (2): 201-292.
- [52] Cronbach LJ (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*. 16 (3): 297-334.
- [53] Nunnally JC, Bernstein I H (1994). Psychometric Theory. New York: McGraw-Hill.
- [54] Rossiter JR (2002). The C-OAR-SE procedure for scale development in marketing. *International Journal of Research in Marketing*. 19 (4): 1-31.
- [55] United Nations Development Programme (UNDP) (2006). Human Development Report. New York: Palgrave.
- [56] Bearden WO, Netmeyer RG (1999). Handbook of Marketing Scales. Thousand Oaks: Sage.
- [57] Bruner II GCB, James KE, Hensel PJ (2001). Marketing Scales Handbook. Chicago: American Marketing Association.
- [58] Netmeyer RG, Bearden WO, Sharma S (2003). Scaling Procedures: Issues and Applications. Thousand Oaks: Sage.
- [59] Spector PE (1992). Summated Rating Scale Construction. Newbury Park: Sage.
- [60] Diamantopoulos A, Siguaw JA (2006). Formative versus reflective indicators in organizational measure development: a comparison and empirical illustration. *British Journal of Management*. 17 (4): 263-282.
- [61] Trochim WMK (2007). <http://www.socialresearchmethods.net/kb/index.php>. Visited on 19th July 2007.