# The relationship between financial affordability and patient behaviour in medication adherence

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## Abstract

*Theoretically* this study focuses on patient's medical adherence as a key success factor in healthcare services. The widespread adherence scales focus on medication habits, healing beliefs and personal barriers in treatment process. Financial circumstances of non-adherent behaviour are barely investigated in scale development although it is an important factor of non-adherent patient behaviour.

*Analytically* our paper refers a financial affordability scale from previous literature (AFFORDABILITY), quantify its reliability (Cronbach's alpha), explore its structure (EFA) and measure its effect (SEM) for medication adherence with the use of the often used MARS5 scale. The sample used for data analysis is unique in adherence research since it is a representative multimorbidity sample of 482 citizens from Hungary.

*Our result* indicates that financial circumstances has a significant, positive and medium strong (0,563) effect on medication behaviour.



**Keywords***: adherence, health-care, financial affordability*

**Track:** *Services marketing*

## 1. Patient adhererence in medical research

The phenomenon itself refers to the relationship and the cooperation between doctor and patient. The concept of this process has changed a few times in the past decades as the paradigm of doctor-patient relationship has evolved (Simon, 2010).

The first concept was *compliance*, which was basically used to capture how accurate patients follow the medication, dietary and sport prescription. Literature rely on this appellation 'compliance' as the measure of cooperation in medication and treatment by the patient. (Vermeire et al., 2001)

At the beginning of this century WHO has implicated that phrase 'compliance' over emphasise the responsibility of the doctor and the patient separately so the concept of compliance has been changed and a new definition should be launched: *'adherence'* (Sabaté & World Health Organization, 2003). This appelation concentrates more on the cooperation, discussion and partnership of the participants in the healing process (Vermeire et al., 2001). Research scholars rely on this phrase more and more in order to express the doctor-patient cooperation (Tilson, 2004).

This collaboration is such complex as several author not even define the meaning of adherence or it is often used as a synonym of compliance (Vermeire et al., 2001).

A third phenomenon must be also introduced here as we write about healthcare cooperation. *'Persistence'* is the measure of the time when the treatment was followed by the patient on a proper adherence level. This is the phenomenon of the successful long time cooperation between doctor and patient and thus it is especially relevant as we speak about chronic diseases (Cramer et al., 2008).

### *1.1. Factors behind being non-adherent*

There might be several reasons if one does not follow the treatment prescriptions (Cameron, 1996; Sabaté & World Health Organization, 2003). The literature is not consistent in listing and groupings for these reasons behind, although two main clusters of non-adherent patients are identified. First group is the *intentional non-adherent* group, those who rebel against the treatment prescription: they might refuse dietary restrictions, or don't trust in the prescribed medicine or just simple don't follow the prescribed dose of medicine and take less. The *non-intentional non-adherent* group don't follow the treatment perfectly due to reasons that they cannot influence personally, such as age, physical or mental limitation access to

therapy and financial barriers as they simply has not enough budget for the medications (Chakrabarti, 2014; Lehane & McCarthy, 2007; Wroe, 2002).

In addition to the two non-adherent groups five interacting dimensions might effect non-adherence.

(1) *Social – economic factors* might be for example family support, employment status, social stigma, insurance system and therapeutic costs.
(2) *Health care team and system-related factors* such as communication between professionals and patient, medicine stocks and availability, follow-up, etc.
(3) *Condition-related factors* are serious symptoms, terms of illness, seriousness of disease, etc.
(4) Under *therapy-related factors* side-effects, terms of therapy, type of medicine are the main listed subfactors.
(5) Age, beliefs, demographic variables, knowledge, multimorbidity are certainly associated with *patient-related factor*. (Kardas et al., 2013; Sabaté & World Health Organization, 2003).

### *1.2. Why adherence is (also) a marketing issue*

Besides several analysis of healthcare marketing (Kotler et al., 2008; Kotler & Clrake, 1987; Simon, 2010) Stremersch and Van Dyck have emerged a new perspective in the Journal of Marketing with the goal to create a new framework and research agenda for marketing in life sciences. Three areas were identified for marketing decision making in healthcare.

1) Therapy creation
2) Therapy launch
3) Therapy promotion

This last third area where loyalty to the treatment strategy might be improved. Optimal treatment programs should be launched which means the patient is able to and willing to follow (Stremersch & Dyck, 2009). These treatment strategies can help to reduce both intentional and non-intentional non-adherence. The novelty of this marketing-focused approach in healthcare that the patient ability and capability is introduced and examined for healing success and the unconditional cooperation of the patient is not assumed.

Similar aspect can be identified through the service view of healthcare. Healing processes, as the service success depends on not only the service provider (doctor, therapist) but also on the client (the patient). The service value of healthcare is a doctor-patient co-creation (Nakata et al., 2019). The service providers (doctors, nurses, therapists, dietitians,

etc.) better not to have for granted the cooperation of the patient but involve their beliefs and capabilities while launching the treatment strategy.

### *1.3. Measuring Adherence*

Complexity of adherence requires multiple technique for measurement. Five main approaches are applied in order to realize patient adherence.

(1) *Direct measurement techniques*: that means measurement of medicine leftovers in the patient's body. This measure is expensive and inconvenient for the patient but nevertheless very precise.

(2) *Database analysis*: if prescriptions and pharmacies are linked it is convenient but buying the medicine doesn't ensure the researcher that it was taken as well.

(3) *Electronic monitoring* of opening the medicine, which is rather expensive methodology.

(4) *Counting pills* between two visits at the doctors' which is cheap and easy with the assumption that pills are not in the box at the end of the period are taken.

(5) *Self-reported questionnaire* which is easy and flexible but traditionally might be biased in several ways (Lam & Fresco, 2015).

In marketing approach of adherence this fifth methodology is applied the most frequently and occasionally combined with any of the other four measurement methodology.

Several scales were developed and used for measuring adherence in scientific medical adherence research. Most widely used scales are MMAS (Morisky Medication Adherence Scale), RAM (Reported Adherence to Medicine) and MARS (Medication Adherence Rating Scale) (Horne et al., 2013). Although these are the commonly used measures, more than 40 scientific measurement scales are available as documented in the literature. These validated scales might be divided into five parts according to the focus of the scales.

(1) First group concentrates only on medication taking habits,

(2) second group focuses on medication taking behviour and barriers for adherence,

(3) third group of scales contains questions only about the barrier of adherence,

(4) fourth group collets information about beliefs associated with adherence,

(5) fifth group highlights barriers and beliefs at the same time (Nguyen et al., 2014).

The *adherence barriers* cover several items such as patient's cognitive function, forgetfulness, support network, but none of the literature based adherence scales focusing on the financial aspects of non-adherence, but still affordability might be a pretty strong predictor for adherence (Sunny et al., 2020; Atella et al., 2005).

Thanks to further literature review two scales were realized on the financial factor of adherence, but one of them is narrowed down for families with child who has serious disease. This scale is one subscale of IoFS (Impact on Family Scale) scale (Stein & Riessman, 1980). The second scale focuses on the medication monetary affordability of adherence hence we will investigate further in this (Schafheutle et al., 2004) in our current study.

## 2. Our Research

In adherence related research several scales focus on medication adherence and try to cover potential barriers and beliefs, but there is no widespread scale measuring the financial aspects of adherence. One generally applicable scale was identified in the literature. This study aims to investigate this affordability-scale as checking its factor structure, report the reliability and assume its effect on medication adherence.

### *2.1. Questionnaire and Sampling*

An *online survey* was conducted in partnership with a market research agency in order to obtain our objectives with the affordability aspects of adherence. The data were collected in January 2020 in Hungary.

In medical adherence research representative samples are barely used while most of the samples are concentrated samples (for example clients of one pharmacy, patients for certain hospital) or focuses on one or few disease groups (asthma, diabetes, etc.). Our *data sample is unique* in adherence research since it is *representative* in Hungary in terms of age, gender and regions. The population for the data collection was citizens with 30 years or above. The total sample size was 1000, and *482 is affected by chronic disease and taking medication regularly*. Their mean age was 59,4 years and 245 were female. 81% of this chronic sample (n=391) has multimorbidity (living with more than one disease).

Two scales were integrated in the questionnaire, one is to assess self-reported medication adherence (MARS5) and another in order to cover financial affordability (AFFORDABILITY).

The scales were translated from English to Hungarian and then translated back to English in order to control that the content has not changed due to the translation.

### *2.2. Scale for adherence affordability dimension*

Although the investigated scale is not widely spread in the literature it was first published 15 years ago. Several publications have applied to measure medication affordability but no Cronbach alpha were reported since (ABC Project Team, 2012; Morrison et al., 2015). The scale consists of 6 statements where items are evaluated on a 5-point scale (from 5-always to 1-never).

- If I'm worried about money, I take less of my medicine to make it last longer
- I have to leave getting my prescription dispensed until I get paid
- If I have a number of different items on my prescription, I don't get them all dispensed, because I can't afford them all at once
- I have in the past borrowed money to pay for my prescription medicines
- Knowing that I will not be able to afford the prescription stops me from going to see my doctor
- If I can't afford my prescription, I don't get my medicine dispensed at all (Schafheutle et al., 2004).

*2.3. Scale for medication adherence*

One of the most often applied adherence scale is MARS5 scale (Horne, 2003). It was developed on the base of Medication Adherence Questionnaire (MAQ) and originally consist of 10 statements (MARS10). The shortened version MARS5 was developed in 2002 (Horne & Weinman, 2002). The 5 statements must be scored on a 5-point scale (from 5-always to 1-never).

- I forget to take the medicine
- I alter the dose of medicine
- I stop taking the medicine for a while
- I decided to miss out a dose
- I take less than instructed

*2.4. Analysis*

Data analysis was run in SPSS for reliability check and PCA (for affordability) and AMOS for the quantification of structural interdependence.

*2.4.1. Reliability:*

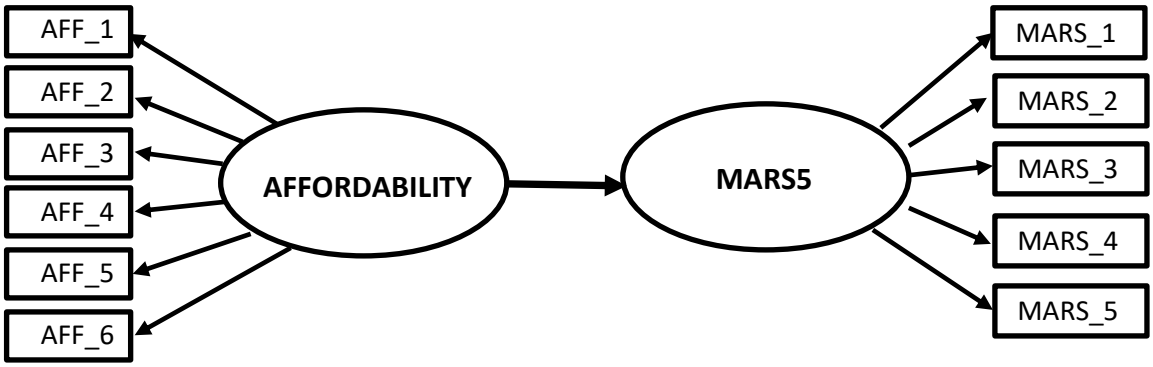
As both scales are reflective scales, the reliability of the two scales were evaluated by Cronbach's Alpha. MARS5 scale has a 0,837 and AFFORDABILITY scale 0,809 reliability measure, so both scales are consistent enough and allowed to use in further research.

*2.4.2. Factor structure for AFFORDABILITY scale:*

As there were no reported factor analysis for the 6-items an EFA has been run for the statements. KMO is 0,869 and Bartlett test has 0,000 p value. All 6 items might be incorporated under one factor with 57,47% total variance explained. The two-factor solution although has higher rate for explanation but eigenvalue is much lower than one (0,819) and only one item takes place in the second factor. According to EFA the six statements can be summarized in one factor and the items might be considered as building elements of the same construct: affordability dimension of adherence.

*2.4.3. Quantification of structural interdependence*

A simple latent variable structural model was built and tested in AMOS to analyse weather the financial AFFORDABILITY is a good predictor for medication adherence (MARS5). The created model has appropriate model fit indicators, as we analyse the most commonly used fit indices (Hooper et al., 2008) as Chi-square = 37,674 (p=0,264), NFI=0,986, RMSEA=0,017, CFI=0,998.




*Structural model for assuming affordability effect on medication adherence (edited by the authors)*

Each root estimates are significant on 0,001 level. The main effect between the two latent construct is estimated 0,563, which should be evaluated as medication financial AFFORDABILITY has medium, positive strong effect on medication adherence (MARS5).

| RELATION | | | ESTIMATES | P value |
|---|---|---|---|---|
| **MARS5** | **<---** | **AFFORDABILITY** | **,563** | 0,000 |
| MARS_1 | <--- | MARS5 | ,434 | 0,000 |
| MARS_2 | <--- | MARS5 | ,706 | 0,000 |
| MARS_3 | <--- | MARS5 | ,834 | 0,000 |
| MARS_4 | <--- | MARS5 | ,835 | 0,000 |
| MARS_5 | <--- | MARS5 | ,639 | 0,000 |
| AFF_1 | <--- | AFFORDABILITY | ,775 | 0,000 |
| AFF_2 | <--- | AFFORDABILITY | ,575 | 0,000 |
| AFF_3 | <--- | AFFORDABILITY | ,674 | 0,000 |
| AFF_4 | <--- | AFFORDABILITY | ,887 | 0,000 |
| AFF_5 | <--- | AFFORDABILITY | ,815 | 0,000 |
| AFF_6 | <--- | AFFORDABILITY | ,394 | 0,000 |

*Standardized Regression Weights for the structural model*

Squared Multiple Correlations for MARS5 is 0,317 which might be evaluate a relatively high explanation in case of one independent variable model.

Covariances were also tested on several relations based on AMOS modification indices.

| RELATION | | | Estimate | S.E. | C.R. | P | Label |
|---|---|---|---|---|---|---|---|
| e_AFF_2 | <--> | eMARS | -,019 | ,008 | -2,330 | ,020 | par_9 |
| e_AFF_4 | <--> | e_AFF_5 | ,037 | ,012 | 2,978 | ,003 | par_10 |
| e_AFF_1 | <--> | eMARS | ,044 | ,012 | 3,723 | *** | par_11 |
| e_MARS_2 | <--> | e_MARS_5 | ,199 | ,028 | 7,131 | *** | par_12 |
| e_MARS_3 | <--> | e_MARS_5 | -,041 | ,018 | -2,288 | ,022 | par_13 |
| e_MARS_4 | <--> | e_MARS_5 | -,030 | ,020 | -1,481 | ,139 | par_14 |
| e_MARS_5 | <--> | e_AFF_1 | ,033 | ,018 | 1,830 | ,067 | par_15 |
| e_MARS_4 | <--> | e_AFF_5 | ,031 | ,011 | 2,815 | ,005 | par_16 |
| e_MARS_1 | <--> | e_MARS_4 | ,014 | ,016 | ,863 | ,388 | par_17 |
| e_MARS_1 | <--> | e_MARS_3 | ,096 | ,019 | 5,019 | *** | par_18 |

*Covariances of the structural model*

## 3. Conclusion, managerial implications and Further Research Direction

From literature review it has emerged that financial affordability plays a relevant role in non-adherent patient behaviour. Although several validated adherence scales focus on adherence those are more about medication adherence acts, beliefs and other barriers but no financial burden is covered under them. This paper has applied a not widespread affordability scale (AFFORDABILITY) and we have assumed its effect on medication act (MARS5). The

financial circumstances have significant, positive and medium strong (0,563) effect on medication behaviour (MARS5).

This relationship underline the need to consider the ability and capability of the patient while creating the healing therapy by health professionals and within these circumstances financial barriers are crucial in case of medication as lack of budget cause lower medical adherence with a high probability.

In further research effects of affordability should be investigated not only for medication practice but also other barriers and belief. Complex structural models should help examine the detailed connections (for example BMQ and INAS scales).

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