

## RESEARCH ARTICLE

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# Patient Involvement in Care and Breast Cancer Patients' Quality of Life- a Structural Equation Modeling (SEM) Approach

Hajar Dehghan<sup>1</sup>, Ali Keshtkaran<sup>2</sup>, Niloofar Ahmadloo<sup>3</sup>, Zahra Bagheri<sup>4</sup>, Nahid Hatam<sup>2\*</sup>

### Abstract

In cancer patients, improving the quality of life is a basic goal of treatment, with the patient – physician relationship as a major factor. Therefore the aim of this structural equation modeling study was to analyze the influence of patient involvement in care on quality of life in 411 breast cancer patients undergoing outpatient chemotherapy and radiotherapy. Two questionnaires were used: 1-patient-physician questionnaire, 2-EORTC QLQC-30 (to measure QOL). The structural equation model exhibited an excellent data fit (Chi-Square= 31.04 / RMSEA= 0.042), T-values for all paths with the exception of that between patient satisfaction and emotional- cognitive function, were significant. According to the findings, various aspects of the physician-patient relationship are significantly and positively associated with quality of life and increasing patient involvement in care by increasing trust and satisfaction, was associated with marked improvement. The findings of this study emphasized the importance of an effective relationship between doctor and patient as a contributing factor for improving the quality of life. Therefore it is suggested that policymakers and decision-makers active in strategic planning for the health system and physicians responsible for treatment pay more attention to developing and improving relationships with patients as an approach to improving patient outcomes, particularly with reference to quality of life.

**Keywords:** Patient-physician relationship- patient involvement in care- quality of life- structural equation modeling

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### Introduction

As a result of universal changes in healthcare system, patients have become the center of attention in this domain. In this circumstance, patients are no longer simple recipients of care, but rather informed and active individuals eager to learn more about their disease and assert more control over their treatment (American Healthways and John Hopkins, 2004). Hence an effective patient-physician relationship is essential for a successful treatment. Having good interpersonal relationships, enhance information exchange, and facilitating patient involvement in decision-making (Ong et al., 1995; Makoul, 2001) are all important elements in a successful treatment. Despite this importance, weak relationships are still a major problem in healthcare which leads to negative impact on patients such as; misunderstanding about the disease and pain and use of opioids for pain-relief, diminished compliance with doctor's treatment order, dissatisfaction with healthcare and decline in quality of life and health (Victoria et al., 2003; Jones et al., 1984).

Different studies have shown that in treatment of chronic diseases such as various kinds of cancers, patients who felt that their doctor is reluctant to talk about their disease were weaker in managing their pain and showed higher levels of stress and anxiety (Jones et al., 1984; Ward and Gatwood, 1994). In contrast, evidence show that patients who were involved in the management of their disease were in better condition and achieved better treatment outcomes (Ward and Gatwood, 1994; Thomas et al., 2002 ).

Studies have shown that higher levels of patient involvement in treatment is in correlation with higher trust levels, increased satisfaction, better self-management and sense of responsibility, and higher quality of life (Thomas et al., 2002; Arora et al., 2009; Quaschnig et al., 2013; Andersen and Urban, 1999 ). In such cases, while patients are undergoing treatment and learning to cope with their diagnosis, hence, the patient-physician relationship plays a vital role in minimizing the stress and anxiety related to their ailment by creating a relaxing, supportive and emotional condition (Karami and keyvanara, 2010;

<sup>1</sup>Students Research Committee, <sup>2</sup>Department of Health Service Administration, School of Management and Information Sciences, <sup>3</sup>Department of Radiotherapy And Oncology, <sup>4</sup>Department of Biostatistics, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran. \*For Correspondence: hatamn@sums.ac.ir

Soltani Arabshahi et al., 2004). In their study, Siminoff et al., (2000) showed that patients whose doctors used a friendlier language had higher satisfaction levels; therefore, to increase patient's satisfaction, physicians need to improve their emotional involvement in their clinical interactions by encouraging patients to ask questions and to participate more actively in their treatment. In cancer patient's treatment, health-related quality of life (HRQOL) is the main purpose of treatment which is the most important factor in comparison to patient satisfaction (Venetis et al., 2009). Effective patient-physician relationship is an important factor in reducing stress and anxiety as well as improving cancer patients' quality of life (Venetis et al., 2009; Farin and Nagl, 2013; de Haes and Bensing, 2009; Fallowfield, 2008); which is related to different aspects of patient-physician relationship such as; empathy, involvement in care, decision-making (Andersen and Urban, 1999; Neumann et al., 2007), and patient satisfaction (Wong and Fielding, 2008).

Trust in physician is an important factor in managing chronic diseases such as cancer. This element can solve patient's problems which lead to information exchange and patient involvement in decision-making, all of which consequently increase patient satisfaction (Platonova et al., 2008; Trachtenberg et al., 2005; Thom et al., 1999; Lee and Lin, 2011). In their study, Holwerda et al., (2013), showed that patients with higher levels of trust and satisfaction experienced less anxiety and stress.

#### *Despite the importance of patient-physician relationship on treatment outcomes*

so far no clear conceptual model of patient-physician relationship has been presented. Hopkins, (2003); Farin and Nagl, (2013); Farin and Gramm, (2013) and Farin and Meder, (2010), Researchers have found different factors to be involved affecting this relationship; Hall et al., (2002) believe trust in physician is the main factor in a patient-physician relationship that includes other components such as: satisfaction, communications, competence and confidentiality

Base on the presented concepts, various patient-physician relationship models have been designed; including; Quaschnig et al., (2013) model, Arora et al., (2009) model and Epstein and Street, (2007) model in which the positive relationship between patient satisfaction and treatment compliance is depended on shared decision-making, empathy and interaction. these are considered as intermediate outcome which leads to improvement in health-related quality of life (Epstein and Street, 2007).

Considering the importance of patient-physician relationships as the cornerstone of quality service, the necessity of an effective relationship between doctors and patients in cancer patients' quality of life is evident. Hence, by studying the effects of various aspects of this relationship on health-related quality of life, we aimed to analyze the effect of this relationship on breast cancer patients' quality of life visiting medical centers of Shiraz, Iran. Epstein and Street, (2007) model was used based on Structural Equation Modeling (SEM) approach.

## Materials and Methods

### *Methodology*

This was a cross-sectional descriptive study; retrospective data was collected in 2014 and sample size was determined Based on the correlation coefficients ( $r = 0.2$ ), type 1 error ( $\alpha = 0.05$ ) and second type ( $\beta = 0.1$ ), reported in related studies (Farin and Nagl, 2013), the sample size was obtained using the following formula of 258 patients.

$$N = \left( \frac{z_{\alpha} + z_{\beta}}{C(r)} \right)^2 + 3 \quad C(r) = \frac{1}{2} \log_e \frac{1+r}{1-r}$$

But since the aim of this study was modeling based on structural equations, due to the high number of parameters studied and the measure of relationships between variables, the sample size was considered as 400 patients. For this reason, 411 breast cancer patients who were under chemotherapy or radiotherapy treatment at Nemazi hospital were randomly selected. Inclusion criteria were that they had received at least 3 session of treatment. The only exclusion criteria were end stage breast cancer patients. For data collection, we used 2 questionnaires; one related to patient-physician relationship and the other on health-related quality of life. The patient-physician questionnaire consisted of questions related to socio-demographic and medical variables such as: age, marital status, education, employment status, and stage of cancer. For this reason, factors affecting patient-physician relationship were extracted from articles (Hopkins, 2003; Ong et al., 1995; Makoul, 2001; Ward and Gatwood, 1994; Quaschnig et al., 2013; Andersen and Urban, 1999; Venetis et al., 2009; Neumann et al., 2007; Platonova et al., 2008; Hall et al., 2002; Mercer et al., 2008; Mercer and Reynolds, 2002) WJ, and created a researcher-made questionnaire comprising of 30 questions; the first section, consisting of 14 questions that evaluated the level of patients' involvement in care using a Likert sample scale (Always, Often, Sometimes, Never – "higher score = higher involvement level"); the second section with 10 questions evaluated the level of patients' trust in their physicians, by using a Likert scale (Strongly agree, Agree, Impartial, Disagree, Strongly disagree – "higher score = higher trust level"); the 6 remaining questions measured patients' satisfaction with their physician using likert scale (Strongly agree, Agree, Impartial, Disagree, Strongly disagree – "higher score = higher satisfaction"). In this research, we used Cronbach's alpha to determine the questionnaire's reliability; Cronbac's alpha coefficient was approximately at 0.884. In order to determine the questionnaire's validity; exploratory factor analysis was used with varimax rotation to identify the factors, as well as conforming the questionnaire's content validity. To verify the factors obtained from the exploratory analysis, confirmatory factor analysis was used. Goodness of fit was investigated based on root mean square error of approximation (RMSEA) and comparative fit index(CFI). Values of RMSEA less than 0.05 indicate close fit, less than 0.08 a reasonable fit and greater than 0.1 a poor fit (Browne and Cudeck, 1992). Values of CFI greater than

0.9 were considered as a good fit (Bentler, 1990).

In order to evaluate breast cancer patients' quality of life, we used the standard EQRTC QLQ-C30 questionnaire published by the European Organization for Research and Treatment of Cancer. This questionnaire consists of 28 questions that uses Likert sample rating scale (Not at all, A little, Quite a bit, and Very much) and 2 questions rated from Very poor to Excellent; these questions evaluate health conditions and quality of life in 5 performance domains (Physical, Cognitive, Emotional, Social and Role functioning), 3 dimensions related to signs and symptoms (Fatigue, Pain, Nausea and Vomiting), 6 separate dimensions related to issues common in cancer patients (anorexia, insomnia, diarrhea, constipation, asthma, and financial/economic problems), and a dimension related to general health indicators. This questionnaire's validity and reliability was verified by Montazeri et al., (2000) study

For data analysis we used SPSS 18.5 and LISREL 8.8 along with descriptive and comprehensive statistics (Pearson's Correlation Coefficient, Exploratory and Confirmatory factor analyses, and Structural Equation Modeling). LISREL's third programming language (Path Diagram) was used to test the model.

## Results

Average age of participants was  $49.8 \pm 8.7$  years; 30.4% of the patients had a diploma, 77.6% were married and 77.4% were unemployed. The highest percentage (40.1%) belonged to patients with stage 1 cancer (Table 1)

Table 1. Characteristics of Participants with Cancer (411 Patients)

Age (Mean/SD)	(49.8 / 8.7)	
	N	Percent
Level of education		
Illiterate	66	16.1
Elementary education	119	29
Diploma	125	30.4
B.A/M.S/Ph.D.	93	22.6
Didn't answer	8	1.9
Employed	N	Percent
Unemployed	318	77.4
Didn't answer		
Marital statuses	N	Percent
Single	35	8.5
Married	319	77.6
Other	51	12.4
Didn't answer	6	1.5
Cancer stage	N	Percent
% Stage 0	3	0.7
% Stage 1	216	40.1
% Stage 2	136	26.8
% Stage 3	32	13.9
Didn't answer	76	18.5

S.D., standard deviation

Table 2. Results for Factor Analysis of the Patient-Physician Relationship Questionnaire based on the Varimax Method with Normalization

Factors	1	2	3	4	5
Questions					
1	0.346	-0.02	0.696	-0.12	0.21
2	0.057	0.346	0.691	0.151	0
3	0.113	0.418	0.595	0.167	-0.022
4	-0.019	0.191	0.474	0.341	-0.245
5	-0.013	0.2	0.689	0.221	-0.026
6	0.007	0.162	0.664	0.199	0.163
7	-0.001	0.066	0.119	0.759	0.138
8	0.034	0.052	0.242	0.753	0.111
9	0.293	-0.013	0.3	0.443	0.024
10	0.023	0.119	0.023	0.76	0.055
11	-0.079	0.073	0.076	0.175	0.677
12	-0.136	0.004	0.04	0.156	0.746
13	-0.135	-0.052	-0.03	0.019	0.698
14	0.118	-0.074	0.384	-0.234	0.427
15	0.546	0.388	-0.047	0.114	-0.153
16	0.457	0.439	0.129	0.212	-0.046
17	0.75	0.149	0.097	0.118	-0.027
18	0.712	0.131	-0.041	-0.063	-0.057
19	0.81	0.149	0.06	0.008	-0.017
20	0.717	0.331	-0.006	-0.089	-0.085
21	0.74	0.186	0.138	0.05	-0.016
22	0.69	0.16	0.159	0.014	-0.05
23	0.632	0.213	0.07	0.135	0.031
24	0.613	0.125	0.021	-0.027	-0.265
25	0.285	0.678	0.115	0.17	-0.075
26	0.079	0.756	0.276	0.212	0.009
27	0.389	0.645	0.126	-0.006	0.02
28	0.244	0.73	0.25	0.047	-0.017
29	0.397	0.673	0.092	-0.04	0.005
30	0.334	0.578	0.172	-0.05	0.067

In this study, we used exploratory factor analysis to evaluate the questionnaire's validity; results for the 5 domain of doctor facilitation for patient involvement in care, providing information to patients, patient decision-making, trust in physician and patient satisfaction are presented in Table 2.

As it can be seen in Table 2, all questions are within their related domain and the questionnaire's validity was verified by exploratory factor analysis. In order to ensure consistency between the structure of the questions and their related domain, a confirmatory factor analysis was performed based on the questions and the 5 domain of patient-physician relationship. Results showed good fit, because the ratio of chi-square statistic to degrees of freedom ( $\chi^2/d.f.$ ) equaled 2.59 and RMSEA value was 0.062; therefore, results for the confirmatory factor analysis revealed that hidden variables are reliably measured by observed variables.

Table 3. Descriptive Statistics of Patient-Physician Relationship and Quality of Life Variables in Breast Cancer Patients

Scale		Theoretical range	Mean	SD
Patient involvement in care scale	Doctor Facilitation	1-4	2.66	0.83
	patient information	1-4	2.86	0.86
	Patient Decision Making	1-4	1.55	0.63
Trust in Physician		0-100	89.78	11
Patient satisfaction		1-5	4.31	0.73
Physical Functioning		0-100	68.63	20.33
Role Functioning		0-100	76.62	26.8
Emotional Functioning		0-100	52.21	29.9
Cognitive Functioning		0-100	73.98	26.84
Social Functioning		0-100	71.24	28.01
Global Health Status/QOL		0-100	62.14	23.8

S.D., standard deviation

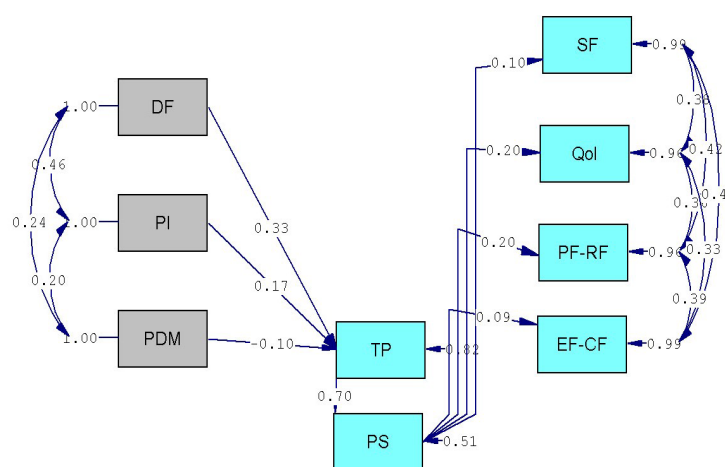
Based on the results, among the patient-physician relationship variables, highest mean belonged to trust in physician (89.78±11.00 out of the maximum 100), and lowest mean related to the patient decision-making (1.55±0.63 out of the maximum 4); also, the highest and lowest means among quality of life variables belonged to role functioning (76.62±26.80), and emotional functioning (52.21±29.90), both out of the maximum of 100 (Table 3).

In this study, the conceptual model of research was analyzed in order to test the model for effects of patient involvement in care on patient trust levels (proximal treatment outcomes), patient satisfaction (intermediate outcome) and breast cancer patients' health-related quality of life (distal treatment outcomes); observed variables consisted of 9 domain as follows: Doctor Facilitation (DF), Patient Information (PI) and Patient Decision-Making (PDM) as independent observed variables, Trust in Physician (TP) as a level 1 intermediate variable, Patient Satisfaction (PS) as a level 2 intermediate variable, and domain of Physical – Role Functioning

(PF-RF), Emotional – Cognitive Functioning (EF-CF), Social Functioning (SF), and Global Health Status (Qol) as dependent variables. It's worth mentioning that in this study, correlation coefficient was high between physical and role functioning domain (r=0.492), as well as emotional and cognitive functioning domain (r=0.533); therefore, they were merged into domains of PF-RF and EF-CF (Figure 1).

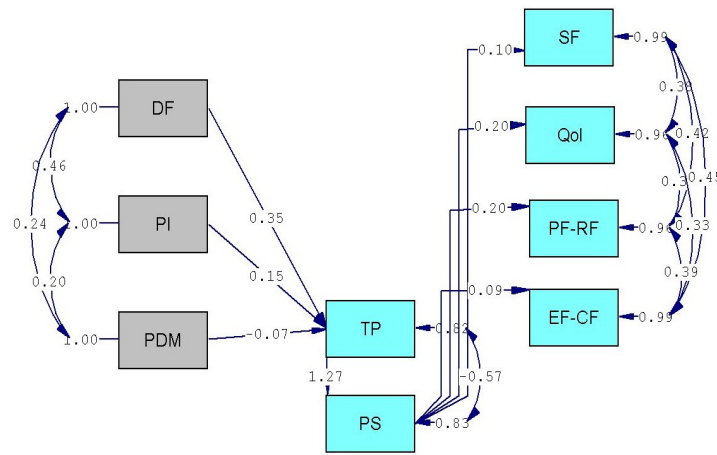
By looking at the standard estimates section of LISREL's output (Figure 1), we realized that the model doesn't have a good fit; because the ratio of chi-square to degrees of freedom equals 4.83 and RMSEA value is 0.097. MI values (Modification Index) in the software's output revealed that we had to consider the link between trust in physician and patient satisfaction domain; doing so, results for the modified model indicated excellent fit; ratio of chi-square to degrees of freedom was 1.72 and RMSEA index equaled 0.042 (Figure 2).

The coefficients significance test and model parameters sections of LISREL's output indicated a positive and



Chi-Square=91.81, df=19, P-value=0.00000, RMSEA=0.097

Figure 1. Model for Effects of Patient Involvement in Care on Breast Cancer Patients' Trust, Satisfaction and Quality of Life in Standard Estimation Mode. (DF), Doctor Facilitation; (PI), Patient Information; (PDM), Patient Decision Making; (TP), Trust in Physician; (PS), Patient Satisfaction; (Qol), Global Health Status; (PF-RF), Physical Functioning- Role Functioning; (EF-CF), Emotional Functioning- Cognitive Functioning; (SF), Social Functioning.



Chi-Square=31.04, df=18, P-value=0.02848, RMSEA=0.042

Figure 2. Model for Effects of Patient Involvement in Care on Their Trust, Satisfaction and Quality of Life in Standard Estimation Mode after Drawing a New Path between TP and PS Domain. (DF), Doctor Facilitation; (PI), Patient Information; (PDM), Patient Decision Making; (TP), Trust in Physician; (PS), Patient Satisfaction; (QoL), Global Health Status; (PF-RF), Physical Functioning- Role Functioning; (EF-CF), Emotional Functioning- Cognitive Functioning; (SF), Social Functioning.

significant relationship between doctor facilitation, patient information and patient trust domain. Also, there was a negative and significant relationship between patient decision-making and patient trust levels (T-Value = -2.04). The coefficients significance test and model parameters sections also suggested a positive and significant relation between patient trust levels and patient satisfaction (T-Value = 11.91). Results revealed a positive and significant relationship between PS and PF-RF (T-Value = 4.00), SF (T-Value = 2.05) and QoL (T-Value = 4.09); however the relationship between patient satisfaction and EF-CF domain was insignificant (T-Value = 1.71).

## Discussion

The model extracted from this study indicates that there is a positive and significant relationship between different aspects of patient-physician relationship and dimensions to breast cancer patients' quality of life, except for EF- CF; Doctor's facilitation for patient involvement in treatment and providing information increases patients trust and consequently increase their satisfaction; also, higher patient satisfaction had a positive and significant relationship with higher quality of life in PF - RF, SF and QoL.

In this study, we anticipated a positive relationship between patient decision-making and trust in physician domains, but we obtained a small negative value, but significant. Reasons behind this negative value could be the difference in understandings that patients may had; further analysis showed that the lesser amount of trust in their physician, the more eager patient is to make personal decisions about their own treatment.

Similar to our study, Farin and Meder, (2010) study, patients' active involvement in decision-making was identified as a constructive factor in improvement of physical and social functioning domain. Anderson and Urban, (1999) in their study showed that patients who

were more involved in decision-making, had better quality of life compared to less involved patients; however, in the present study patient-physician relationship had no significant effects on emotional and cognitive functioning domain; nevertheless significant effects were observed in the other domains. Smith et al., (2006) study showed that the more doctors facilitate patients' involvement in the treatment and the more information they provide, therefore patients feel more satisfied, and consequently this improves patients' quality of life in the emotional functioning domain; while in our study, patient-physician relationship improved quality of life in all domains except on quality of life in emotional and cognitive functioning domain. Results from Pinto et al., (2014) study, while being consistent with our results; they stated that "patients who received more information during treatment had higher satisfaction and health-related quality of life". In Neumann et al., (2007) study physician empathy had an indirect effect on cognitive, social and emotional domain of quality of life. This was done by responding to patients' eagerness toward acquiring information on new findings and treatment options to improve their health conditions. In their examined model, Arora et al., (2009) showed that physicians who use shared decision-making and as a result increase patients' involvement in their care, cause improvement in patients' quality of life in the mental function dimension; although, the physician's shared decision-making approach had no effect on quality of life in the physical functioning domain. Quaschnig et al., (2013) study showed shared decision-making, physician empathy and interaction between patient and the treatment team had a positive effect on patient satisfaction and treatment compliance. In comparison, Quaschnig et al., (2013) model considered patient satisfaction and treatment compliance as an outcome variable, while in our study patient satisfaction was an intermediate variable. Results from Lim and Paek, (2013) study verifies our findings related to the effects of supporting patient decision-

making on quality of life; the only difference was that in Lim and Paek, (2013) study patient self-sufficiency was an intermediate variable for increasing the quality of life, while in our study, shared decision-making increased quality of life through the intermediate variables of patient trust and satisfaction.

Based on Farin and Nagl, (2013) study patient satisfaction is the most significant factor in patient-physician relationship to improve emotional, social and role functioning domain of patients' health-related quality of life in short term; physicians who actively engaged patients in treatment and paid attention to their participatory and communication needs, helped to improve health-related quality of life. In Farin and Gramm, (2013) study, patient satisfaction was significantly related to higher quality of life in short term; but in the intermediate term, in addition to patient satisfaction, patients' trust in physician was also related to increase in quality of life. The present study also revealed high correlation between patients' trust in physician and their level of satisfaction; patients with higher trust level and satisfaction had higher quality of life. Results from the studies done by Holwerda et al., (2013) and Lee and Lin, (2011) also verified our findings; the only difference was that in Holwerda et al., study patient stress and anxiety levels were selected as the outcome variables, while the present study considers patients' quality of life as an outcome variable. Also, in their regression analysis, Lee and Lin (2011) showed diabetic patients' trust in their physician as a positive relationship with their satisfaction level and the physical domain of their quality of life.

Our study revealed that in chronic diseases such as cancer, effective patient-physician relationship enhances patients' quality of life. Furthermore, physician's efforts to engage patients in treatment, by providing patients with appropriate and thorough information on their disease prognosis and the treatment and its side-effects encourages patients to express their views, opinions and concerns that results in patients' trust and satisfaction levels and consequently their quality of life. Therefore In order to increase patients' trust, satisfaction and quality of life, it's necessary for doctors to provide the grounds by allocating more time for patients encourage their involvement in treatment and respond to their needs. It's also necessary that doctors encourage patients to ask questions and be more actively engaged in their own treatment by increasing their own emotional involvement in clinical encounters. Physicians should pay more attention to improve and develop their relationship with patients as a useful approach for improving treatment outcomes as well as reducing treatment costs. We also suggest that authorities and policymakers pay more attention to the subject of patient-physician relationship in the medical student curricula to develop physicians' communication skills which is patient-centered.

In this study, the tested model was based on previous studies on effects of patient involvement in treatment on quality of life, and it was examined based on empirical findings. Patient-physician relationship is a practically dynamic process and it's affected by multiple factors; the effects of this relationship on different dimensions of

quality of life are indeed far more complex and dynamic than our presented model. There were numerous factors affecting our model, which unfortunately we weren't able to examine in this study.

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