

## RESEARCH ARTICLE

# Trajectory model of adherence to cervical cancer treatment in central Mexico during the COVID-19 era

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**Abstract: Background:** Cervical Uterine Cancer is a disease that explains the vulnerability in which women find themselves in terms of reproductive health with an impact on occupational health and public health, even though in Mexico the prevalence rate is lower than the other member countries. of the OECD, its impact on Human Development and Local Development shows the importance that the disease has in communities more than in cities where prevention policies through check-ups and medical examinations seem to stop the trend, but they show the lack opportunities and capabilities of health centers in rural areas. **Target:** To establish the reliability, validity and correlations between the variables reported in the literature with respect to their weighting in a public hospital. **Methods:** A non-experimental, cross-sectional, and exploratory study was carried out with a non-probabilistic selection of 104 patients from a public hospital in the State of Mexico. The Scale of Psychosocial Variables Determining Adherence to Treatment of Cervical Cancer was constructed. **Results:** From a structural model [ $\chi^2 = 490.330$  (28 df)  $p = 0.000$ ; GFI = 0.927; CFI = 0.970; RMSEA = 0.003] the fit of the trajectories of determinant relationships in which knowledge influenced treatment adherence behavior was demonstrated ( $\beta = 0.50$ ). **Conclusion:** The limits of the design, sampling and analysis of the study are noted, and it is recommended to include organizational and psychological variables based on theories of organizations and theories of personality.

**Keywords:** public health, trajectory model, adherence to treatment, COVID-19

## 1 Introduction

Cervical cancer is a highly prevalent disease among the member countries of the Organization for Economic Cooperation and Development (OECD) [1]. During the period from 2001 to 2022, Mexico ranked penultimate (20 out of 100 diagnostic requests) for diseases linked to cervical cancer in a list led by the United States of America (85 out of 100 requests) [2]. The prevalence of cervical cancer in the OECD is a public health problem with an emphasis on the female sector of the population and its impact on occupational and reproductive health as emerging problems among the member countries [3]. Psychological and social studies around public health have established three phases related to i) primary prevention or stage in which the system is committed to reducing risks by promoting lifestyles free of violence [4]; ii) secondary prevention consist of immediate attention from an early warning [5]; iii) tertiary prevention or long-term response indicated by treatment and rehabilitation, conflict transformation and reconciliation [6].

In this way, the theory of reasoned action, the theory of planned behavior and the theory of adherence to treatment explain the dependency relationships between the psychosocial determinants involved in each of the phases of primary, secondary, and tertiary care [7]. The theory of reasoned action, grosso thus, it maintains that the expected behavior in each of the attention phases is determined by perceptions of control, beliefs, norms, attitudes, and intentions [8]. It is a predictive model of behaviors that reduce the risks around a public health problem based on the increase in preventive skills such as searching for information and requesting medical examinations [9]. Such skills are mediated by dispositions in favor of personal health and rational decision making [10].

However, the generality of the information concerning a disease is not always linked to specific decisions and specific behaviors [11]. Therefore, psychosocial studies delimited the model of reasoned action in a planned behavior [12]. The theory of planned behavior assumes

that individuals process the information surrounding an illness in such a way that they increase their perceptions of control of the situation [13]. In this sense, people categorize the information and link it to planned strategies to reduce the risks of a diagnosed disease and, where appropriate, adherence to a biomedical treatment [14].

Unlike the model of reasoned action, the model of planned behavior includes a close link between perceptions of control with respect to real control of their situation, as is the case of adherence to treatment [15]. Even the planned behavior is the result of a specific control by it is not enough to assume a skill to carry out the rehabilitation, but it is essential to place this skill in the same period as the disease and not only as an experience. from years ago [16]. Although the theory of planned behavior explains in greater detail the relationships between psychosocial variables that affect adherence to treatment, some findings reported in the state-of-the-art show that there is an interrelation between psychosocial factors with respect to biomedical, institutional, and clinical variables [17]. Cultural. In this way, the theory of adherence to treatment warns of the importance of organizational culture over perceptions of control that the theory of planned behavior identifies as preponderant factors in adherence to treatment [18]. This is so because the adherence to treatment model assumes that intercultural values facilitate adherence to treatment in contexts and institutions where people of different and diverse nationalities work [19]. That is, to the extent that a culture potentiates the rights to reproductive and occupational health, it increases the values of self-care and the perception of control of the personal situation [20].

The objective of this study is a) to establish the reliability and validity of scales that measure perceptions, beliefs, values, motives, knowledge, attitudes, intentions, and behaviors related to adherence to cervical cancer treatment and b) to establish dependency relationships among the determining variables of adherence to cervical cancer treatment. The research question that the study aims to answer is: What are the differences and similarities between the theoretical dependency relationships of the variables that determine adherence to treatment with respect to the weighted correlations? Therefore, the null hypothesis deals with the adjustment of the theoretical dependency relations with respect to the estimated correlations and the alternative hypothesis states that the theoretical structure is different from the weighted structure [21].

## 2 Methods

### 2.1 Design

A non-experimental, cross-sectional and exploratory study was carried out considering the period of the pandemic from December 2019 to April 2022.

### 2.2 Sample

A non-probabilistic selection of 104 patient's female (Mean = 23.1 Standard Deviation = 2.34) from a public hospital in the State of Mexico. 60% finished primary school, 21% secondary school, 12% high school and 7% entered a higher education modality. 64% have incomes of less than 3,500 pesos (Mean = 3,300 and Standard Deviation = 124.34) per month, 22% earn between 3,500 and 7,000 pesos (Mean = 5,612 and Standard Deviation = 234.23) and 14% earn more. of 7,000 pesos (Mean = 7,541 and Standard Deviation = 245.35) per month. 35% are single, 40% are married, and 25% are separated or divorced.

### 2.3 Instrument

The Scale of Psychosocial Determinants of Adherence to Treatment was used based on the definitions reported in the literature [22]. It includes 32 items that measure eight dimensions related to perceptions, beliefs, values, motives, knowledge, attitudes, intentions, and behaviors related to adherence to cervical cancer treatment.

### 2.4 Process

The operational definitions were established from the psychosocial traits alluding to a) the search for and handling of information related to cervical cancer; b) the request for check-up and/or medical examination; c) confirmation of the initial diagnosis; d) medication intake; e) attendance at rehabilitation or therapy sessions.

The Delphi technique was used to homogenize the meanings of words included in the items on the scale [23]. The surveys were applied in the social work office of the general hospital.

The confidentiality of the results was guaranteed in writing, and it was reported that they would not affect the quality of care or the payment of medical services [24]. The information was processed in the Statistical Package for Social Sciences (SPSS for its acronym in English) and Analysis of Structural Moments (AMOS for its acronym in English).

### 2.5 Analysis

An internal consistency analysis was performed with Cronbach’s alpha parameter [25]. The adequacy and sphericity parameters were estimated (Bartlett and Kayser Meyer Olkin tests) to carry out the validity estimation [26]. The factorial analysis was carried out considering the number of items and the size of the sample. In this sense, an exploratory analysis was carried out with a promax rotation and obliquity criterion. Subsequently, a confirmatory analysis with least squares was carried out. Adjustment and residual parameters were calculated for testing the null hypothesis [27].

## 3 Results

The internal consistency of the general scale (alpha = 0.882) and the subscales of perceptions (alpha = 0.892), values (alpha = 0.881), motives (0.856), attitudes (alpha = 0.801) and intentions (alpha = 0.841) reached values optimal, but in the case of the subscales of beliefs (alpha = 0.643), knowledge (alpha = 0.656) and behaviors (alpha = 0.612) they had sufficient values. (see Table 1)

**Table 1** Descriptive, reliability and validity of the instrument (Source: Elaborated with data study)

R	items	M	SD	A	F1	F2	F3	F4	F5	F6	F7	F8
	Perception’s subscale			0.892								
r1	When looking for information from the CACU I will have more options	3.24	1.04	0.843	0.521							
r2	When applying for a CACU exam I will be more uneasy	3.57	1.05	0.891	0.532							
r3	When taking the medications, I will have more anxiety	3.12	1.06	0.835	0.591							
r4	By going to therapies I will reduce my depression	3.05	1.15	0.821	0.562							
	Belief subscale			0.643								
r5	Searching for information about CACU increases anxiety	1.23	0.16	0.654		0.481						
r6	Asking for a diagnosis of CACU reduces depression	1.35	0.18	0.615		0.492						
r7	Taking medication increases hope	1.26	0.31	0.632		0.472						
r8	Going to rehab exhausts the person	1.28	0.01	0.647		0.453						
	Values subscale			0.881								
r9	A person looking for information about CACU	1.92	1.95	0.861			0.403					
r10	A person requesting a CACU study	1.23	1.46	0.805			0.491					
r11	A person who attends rehab	1.84	1.36	0.832			0.467					
r12	A person who takes medications against CACU	1.36	1.38	0.843			0.478					
	Motive subscale			0.856								
r13	Sought information from CACU to avoid concerns	3.24	1.43	0.814				0.592				
r14	I request a CACU study to reduce my anxiety	3.57	1.59	0.836				0.546				
r15	I go to rehabilitation sessions to increase my hope	3.41	1.37	0.892				0.587				
r16	I take medicine against CACU to live longer	3.92	1.31	0.841				0.526				
	Knowledge subscale			0.656								
r17	Seeking CACU Information Raises Hope	1.01	0.32	0.632					0.481			
r18	Requesting a CACU study reduces depression	1.04	0.46	0.651					0.456			
r19	Going to rehab lessens worry	1.05	0.58	0.694					0.436			
r20	Taking medications against CACU increases fear	1.02	0.68	0.605					0.382			
	Attitudes subscale			0.801								
r21	The information about the CACU is understandable	3.05	1.01	0.843						0.301		
r22	The CACU study request is inexpensive	3.46	1.23	0.856						0.465		
r23	Rehabilitation assistance is exhausting	3.68	1.25	0.867						0.572		
r24	Taking medication against CACU is frustrating	3.32	1.46	0.832						0.396		
	Intention’s subscale			0.841								
r25	I would look for information to prevent CACU	3.82	1.32	0.8432							0.302	
r26	request studies to cure myself of CACU	3.46	1.47	0.842							0.546	
r27	I would go to rehab to live longer	3.58	1.36	0.894							0.568	
r28	I would take medications against CACU to avoid surgeries	3.15	1.31	0.856							0.476	
	Behavior’s subscale			0.612								
r29	Minutes to read information about the CACU	9.24	1.13	0.601								0.382
r30	CACU Study Applications	1.32	1.15	0.631								0.346
r31	Attendance at rehabilitation sessions	5.47	1.58	0.673								0.594
r32	Number of daily medications against CACU	1.02	1.30	0.621								0.321

### 3.1 Extraction method

Main axes with promax rotation and obliquity criterion. sphericity and adequacy [ $\chi^2 = 247.23$  (56df)  $p = 0.000$ ;  $KMO = 0.702$ ]. M = Mean, SD = Standard deviation; F1 = Perceptions (31% of the total variance explained), F2 = Beliefs (24% of the total variance explained), F3 = Values (17% of the total variance explained), F4 = Motives (14% of the total variance explained),

F5 = Knowledge (11% of the total variance explained), F6 = Attitudes (7% of the total variance explained), F7 = Intentions (5% of the total variance explained), F8 = Behaviors (3% of the total variance fully explained). The alpha values correspond to the consistency of the subscale removing the reagent. CACU = Uterine Cervical Cancer, the adequacy and sphericity parameters [ $\chi^2 = 247.23$  (56df)  $p = 0.000$ ; KMO = 0.702] allowed estimation of construct validity.

In this way, eight factors related to perceptions (31% of the total variance explained), beliefs (24% of the total variance explained), values (17% of the total variance explained), motives (14% of the total variance explained), knowledge (11% of the total variance explained), attitudes (7% of the total variance explained), intentions (5% of the total variance explained) and behavior (3% of the total variance explained). (see Table 2)

**Table 2** Covariances between exogenous variables

			Estimate	IC	CR	P
Beliefs	<->	Values	0.124	0.116	1.072	0.281
Beliefs	<->	Perceptions	0.459	0.089	5.144	***
Values	<->	Perceptions	0.603	0.281	5.711	***

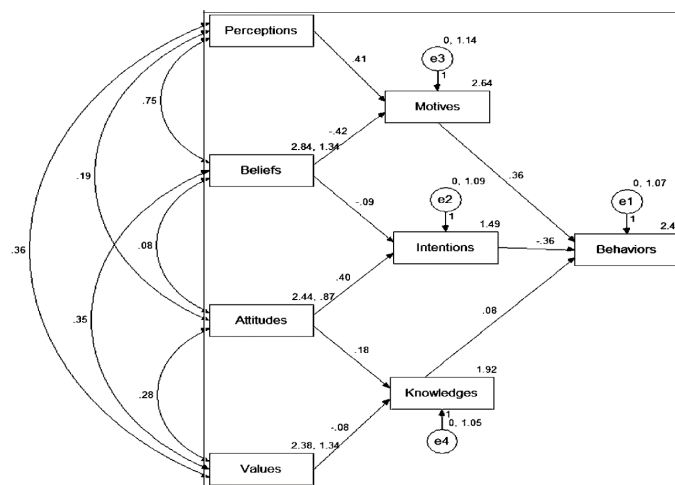
Note: \*  $p < 0.01$ , \*\*  $p < 0.001$ , \*\*\*  $p < 0.0001$ . Source: Elaborated with data study

Values were positively and significantly associated with perceptions (cov = 0.603) and these with beliefs (cov = 0.409). In contrast, values and beliefs had a spurious relationship close to zero (cov = 0.124). In the establishment of the model of trajectories of relationships that determine treatment adherence behavior, knowledge determined treatment adherence behavior ( $\beta = 0.498$ ), followed by intentions ( $\beta = 0.417$ ) and motives ( $\beta = 0.215$ ). (see Table 3)

**Table 3** Dependency relations between variables

			Estimate	IC	CR	P
Reasons	<-	Beliefs	-0.041	0.115	-0.357	0.721
Knowledge	<-	Beliefs	0.475	0.076	6.280	***
Reasons	<-	Perceptions	0.305	0.050	6.098	***
Knowledge	<-	Values	0.077	0.024	3.147	0.002
Attitudes	<-	Beliefs	-0.364	0.200	-1.817	0.069
Attitudes	<-	Reasons	0.163	0.094	1.744	0.081
Attitudes	<-	Knowledge	0.088	0.141	0.626	0.531
Intentions	<-	Reasons	0.349	0.092	3.772	***
Intentions	<-	Knowledge	0.363	0.126	2.888	0.004
Intentions	<-	Values	0.041	0.060	0.682	0.495
Intentions	<-	Perceptions	0.088	0.086	1.020	0.308
Intentions	<-	Attitudes	0.262	0.053	4.901	***
Behavior	<-	Intentions	0.417	0.059	7.049	***
Behavior	<-	Reasons	-0.215	0.101	-2.141	0.032
Behavior	<-	Knowledge	0.498	0.135	3.679	***
Behavior	<-	Perceptions	0.052	0.091	0.570	0.569
Behavior	<-	Values	0.134	0.064	2.086	0.037

Note: \*  $p < 0.01$ , \*\*  $p < 0.001$ , \*\*\*  $p < 0.0001$ . Source: Elaborated with data study



**Figure 1** Model of trajectories of relationships that determine the behavior of adherence to treatment. Source: Elaborated with data study.

Regarding the trajectories of relationships that determine the behavior of adherence to treatment, the path that goes from motives to behavior ( $\beta = 0.36$ ) explains the deliberate process adherence to treatment. In other words, the processing of information concerning Cervical Uterine Cancer, when reduced to beliefs and then assimilated as knowledge, has a preponderant effect on the behavior of adherence to the treatment of the disease in the study sample (see Figure 1).

Finally, the adjustment and residual parameters [ $\chi^2 = 490.330$  (28 df)  $p = 0.000$ ; GFI = 0.927; CFI = 0.970; RMSEA = 0.003] allowed to establish the contrast of the null hypothesis that was accepted. In other words, the dependency relationships between eight variables reported in the state of the art correspond to the estimates made in the model of determining relationships.

## 4 Discussion

The contribution of this study to the state of knowledge, which highlights adherence as a health promotion factor, lies in the empirical evidence of a trajectory model. Motives were found to influence behavior [28]. In other words, the sample surveyed suggests that adherence is determined by a continuous process of motivation. The consulted literature warns that adherence to treatment is an intermediate phase of rehabilitation [29]. The present work suggests that adherence is not a phase but a response induced by the interest of those who surround the sick or patient. Consequently, lines of study related to the relationship between motivation and adherence will open the discussion around the phases of treatment and rehabilitation.

The trajectory that goes from the perception of risks to the reasons for adherence to treatment suggests that the sample surveyed considers expectations as indirect determinants of adherence behavior to treatment. It then means that risk communication impacts adherence behavior because it spreads the risks associated with abandoning or slowing down treatment [30]. Therefore, it is necessary to measure the impact of risk communication related to cervical cancer.

Another finding suggests that the predictive pathway of treatment adherence behavior begins with attitudes and their high incidence on intentions, but the negative impact of these on behavior warns that deliberate, planned and systematic treatment is counterproductive. Future studies on the systematization of self-care will define the type of treatment or rehabilitation process determined by intentions as mediators of attitudes.

## 5 Conclusion

The contribution of this study is to have established the reliability and validity of an instrument that measures psychosocial variables that determine the behavior of adherence to treatment. However, the non-experimental design, the non-probabilistic selection and the exploratory factor analysis pose limits that affect the findings of this study. Therefore, it is necessary to carry out an experimental study with a probabilistic sample and confirmatory factor analysis to demonstrate the direct effect of beliefs on behavior and the indirect determinant relationship through knowledge. Since other organizational and psychological variables can be included in the model of determining relationships, such as work environment, commitment, innovation, self-concept, self-efficacy, locus of control, assertiveness or anxiety, a new specification based on organizational theories is necessary. personality theories.

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