

# The Psychometric Testing of a Health Belief Model and Theory of Reasoned Action Based Questionnaire on Hepatitis C Perceptions, and Testing Intention among Age Wave Group

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Received date: 02 May 2016; Accepted date: 28 May 2016; Published date: 31 May 2016.

Citation: Rashrash ME, Maneno MK, Wutoh AK (2016) The Psychometric Testing of a Health Belief Model and Theory of Reasoned Action Based Questionnaire on Hepatitis C Perceptions, and Testing Intention among Age Wave Group. J Pharm Anal Insights 1(3): doi <http://dx.doi.org/10.16966/2471-8122.111>

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## Abstract

**Background:** The use of questionnaires to measure people's perceptions is extensively used by researchers. However, no questionnaire developed for measuring baby boomers' HCV-related perceptions.

**Purpose:** This study aimed to develop and test a theory-based questionnaire on people's perceptions regarding HCV testing.

**Methods:** A cross-sectional study was conducted in Washington DC area in 3 phases: 1) Developing the questionnaire 2) Specialists evaluation and editing 3) checking for acceptability and reliability.

**Results:** The questionnaire subscales had Cronbach  $\alpha$  value ranged from 0.64 to 0.85, whereas inter-item correlation (IIC) for all constructs had a value of less than 0.8. Moreover, the corrected item-to-total correlation coefficients were all higher than 0.2.

**Conclusion:** The questionnaire was validated and regarded as a valuable instrument to be applied in assessing perceptions of AABBs on HCV testing. Nonetheless, reevaluation is still being important to assure its relevance particularly if it applied to various populations.

**Keywords:** Questionnaire; HCV; Reliability; Health Belief Model (HBM); Psychometric testing

## Introduction

Since many years ago, scientists have been devoted to building appropriate instruments that allow them to assess people's perceptions. Obviously, this is not a simple mission to do. Nevertheless, for those who chose to accomplish this, their keenness was founded on what formerly stated in Health Belief Model (HBM). The HBM proposes that wherever in turn for a person to modify his behavior for good health, he should have his personal awareness of the possibility of occurring of a condition that could negatively influence his health. He also must be worried regarding the threat of the disease and perceived that executing proper act concerning the prophylaxis of the condition will balance the risk of taking the action [1]. Therefore, one of the feasible manners that can be employed to assess people's perceptions is using survey questionnaire. The application of questionnaire as an instrument to evaluate people's perceptions has been extensively employed by various scientists. This is for the reason that; survey questionnaire is among the simplest and most economical means for data acquisition. Hence, it is one of the most commonly applied research instruments particularly in studies including a high number of participants, allowing statistical evaluation that will provide larger power in contrast to other manners [2,3]. Furthermore, the questionnaire is amongst the easily received manners by people as contrasted with the longer invasive studies such as experimental investigations. Apparently, the utilization of inappropriate questionnaire is a waste of resources.

Therefore, a proper ground work and validation of survey instrument are fundamental for the value of the gathered information [4].

In the United States (US), approximately 4 million people are currently infected with HCV. Consequently, it has become the main blood-borne infection especially among people born between 1945 and 1965 commonly known as "Baby Boomers" (BBs) [5-7]. "Baby Boomers" are responsible for three quarters of the HCV infections in the US although they are only 27 percent of the entire population [8]. Despite the promotion of HCV testing services, they remain underused [9], thus expansion of these activities is needed in order to encourage greater use of screening services by the public. Given the burden of HCV disease among "baby boomers" (BBs), expanded HCV testing along with linkage to care, could avoid the expensive outcomes of chronic liver ailments and can save about 120,000 lives [8]. Recent recommendations from the CDC published in August 2012 emphasized that all BBs should have a one-time HCV test. Despite this, BBs response has been very low for HCV testing [8]. The reluctance of BBs to pursue HCV testing can have negative consequences on the public health attempts to manage the HCV epidemic among this population [8].

Little is known about HCV testing behaviors among African-American Baby Boomers (AABBs). To understand this phenomenon and to identify potential solutions, it is necessary to recognize the level of knowledge and variations in perceptions of HCV testing amongst AABBs.

An extensive literature review has also shown a scarcity of theory-based research examining factors that predict or explain the willingness of BBs to have an HCV test. Specifically, variables related to the HBM and TRA variables (perceptions, cues to action, and subjective norms) on HCV testing among AABBs is not well investigated. It is vital that the preparation and execution of health plans must be preceded by theoretical models of behavior. Applying public health strategies without validated models will result in inadequately planned prevention campaigns [10].

Therefore, this demonstrates how vital it is to have the adequate instrument to assess BBs' perceptions on HCV testing so that the proper solution can be applied to solve the problem. Thus, the aim of this study is to develop and validate a TRA/HBM based questionnaire.

## Methodology

### Survey creation

The survey used in this study was created from the previously used instrument with items aggregated to allow for assessment of HBM/TRA constructs using a survey questionnaire by Poss [11], which was modified to suit our study population and subject matter [12]. This survey was specifically selected based upon its integrated use of HBM and TRA models. The questionnaire had high reliability with Cronbach's alpha values ranging from 0.71 to 0.96.

### Validity testing

In this study content and face validity were assessed. More specifically, six professors from Howard University faculty who were experts in HCV research reviewed the final items after survey creation and evaluated the suitability of the questions in assessing perceptions of HCV. Respondents assessed face validity as after each interview they were handed a paper-based questionnaire asking them about any difficulties that they might face with individual questions or the time spent in answering the questionnaire and some other questions related to the language, wording, clarity, and appropriateness of responses [13].

### The study

A study including a sample of 30 AABBs was conducted to examine the face validity, acceptability, and internal consistency reliability of the study instrument before using it in larger studies. Based on a literature review, the sample size of 30 respondents was deemed sufficient to assume normal distribution and use of parametric tests during the pilot study [12,14-18]. The audio computer-assisted self-interview (ACASI) was used to administer the survey questionnaire of the study.

### Reliability testing

In this study, Cronbach's alpha was reported for separate constructs and not for the entire instrument as suggested in the literature [19]. Also, a cut-off of <0.5 for Cronbach's alpha was used to remove items that reduce the internal consistency as proposed in the literature. Furthermore, items with a corrected item-total correlation of <0.30 were deleted as recommended [20,21]. The inter-item correlation analysis was performed to examine if there were inconsistently low or high correlated items [22]. A test was carried out to purify the subscale by defining low or highly correlated items. Highly correlated items (>0.80) indicate that the items are almost similar, while low correlated items (<0.20) indicate that the item is not measuring the same subscale measured by other elements contained in the subscale [23,24]. Items with inter-item correlations >0.80 also indicate the potential problem of multi collinearity, consequently, should be removed from the questionnaire [20,21]. However, questions of particular importance were retained regardless of their result in the correlation analysis as suggested in the literature [14].

A similar approach was applied when considering results of the corrected item-total correlations. As afore mentioned values <0.30

were deleted as recommended [20]. However, questions of particular importance were retained regardless of their result in the analysis [14].

## Results

### Characteristics of participants

The characteristics of the interviewees are presented in table 1. As shown, the mean age of respondents was (56.6 ± 6.8 years). Findings also showed that 40% were married and slightly over half were high school educated. The majority of the respondents had health care coverage 29 (96.7%) and did not receive a blood transfusion before 1992 (86.7%).

HCV-related features showed that approximately half of respondents (43.3%) had the intention to test HCV, and 56.7% had a prior HCV test.

### Acceptability of the HBM/TRA adapted questionnaire

Acceptability findings are presented in table 2. Overall the adapted questionnaire was well accepted. More specifically, all participants reported having sufficient time and possessing an adequate understanding of the survey items. A high proportion 28 (93.3%) also reported ease in answering the questions and most stated that all questions were clear and that response choices were appropriately presented.

### Reliability and internal consistency findings of the adapted HBM/TRA questionnaire

Table 3 shows both Cronbach's alpha values ( $\alpha$ ) for each subscale before and after item deletion and the values of corrected item-total correlation ( $R$ ). The low corrected inter-item correlation values are indicated in

<b>Age (Mean ± SD)</b>	56.6 ± 6.8
<b>Number of children under 18 (Mean ± SD)</b>	1.17 ± 2.037
<b>Gender (N (%))</b>	
Male	18(60.0)
Female	12(40.0)
<b>Marital Status<sup>b</sup> (N (%))</b>	
Married	12(40.0)
Divorced/Separated	11(36.7)
Never Married	6(20.0)
<b>Education<sup>b</sup> (N (%))</b>	
High School	16(53.3)
College Degree	8(26.7)
Graduate Degree	5(16.7)
<b>Health Care Coverage (N (%))</b>	
Yes	29(96.7)
No	1(3.3)
<b>Annual Household Income<sup>b</sup> (N (%))</b>	
Less than \$25,000	14(46.6)
Less than \$50,000	5(16.6)
Less than \$75,000	5(16.7)
\$75,000 or more	3(10.0)
<b>Intention to test (N (%))</b>	
Yes	13(43.3)
No/Unsure	17(56.7)
<b>Prior to 1992 received a blood transfusion or blood products (N (%))</b>	
Yes	2(6.7)
No/Unsure	28(93.3)
<b>Prior test for hepatitis C (N (%))</b>	
Yes	17(56.7)
No	13(43.3)
<b>Test Result<sup>a</sup>(N (%))</b>	
Negative	15(88.24)
Positive	2(11.76)

**Table 1:** Characteristics of Respondents of the Pilot Study

<sup>a</sup> Total may not add up to 30 because of inapplicable responses.

<sup>b</sup> Total may not add up to 30 because of missing responses.

Q1-Did you have any difficulties answering any specific questions? (N (%))	28(93.3)
No	2(6.7)
Yes	
Q2-Was the time required to complete the questionnaire reasonable? (N (%))	30(100.0)
Yes	
Q3-Were there any unclear questions? (N (%))	29(96.7)
No	1(3.3)
Yes	
Q4-Are all the words and questions easily understood? (N (%))	30(100.0)
Yes	
Q5- Are the response choices appropriate? (N (%))	1(3.3)
No	29(96.7)
Yes	

**Table 2:** Acceptability of the HBM/TRA Adapted Questionnaire.

bold. In the susceptibility subscale, the deletion of the item (3) improved the alpha value of the subscale to 0.685 and the deletion of the item (5) increased the alpha value of the subscale to (0.651). Low *R* values were also observed with the items above as well as item 2. Per study criteria, item 3 and item 5 were deleted accordingly, and item 2 left for its particular importance to the study.

For the severity subscale, the Cronbach's alpha value improved significantly with the removal of item 3(0.61 to 0.65). The same item along with the item (1) was deleted as their *CITC* values were <0.3; however, item 2 was left for its specific importance to the study.

Findings related to the benefits subscale indicated that, items 4 and fivefit criteria for deletion. More specifically, deletion of item 4 improved the alpha value and item 5 had a low *R* value.

The perceived barriers and subjective norms *CITC* values were more than (0.30), and alpha values ranged from (0.75-0.85). All items were kept in both subscales.

To summarize, the item (4) in susceptibility subscale, item (1) in severity subscale, item (4) in benefits subscale were kept in the subscales for their importance to the study despite *CITC* values of <0.3.

Inter-Item Correlations (IIC) of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, subjective norms subscales how no value >0.80 in these values. Consequently, all items were kept according to the criterion of inter-item correlation.

## Discussion

The majority of participants reported that the items were clear and easy to understand. Cronbach's alpha values were all between 0.64 and 0.85; inter-item correlations were all <0.8 and corrected item-to-total correlation coefficients were all >0.2. These findings were consistent with the findings from a study done by Poss [18], who developed and evaluated a new instrument to study TB screening behavior. These results indicate that this instrument is consistent and reliable and can be used for HCV testing behavior as well.

Primarily the items in all constructs have an acceptable Cronbach  $\alpha$  of 0.58 to 0.85. However, some of them did not satisfy the alpha value predetermined for the study which is 0.60. A possible rationalization for these values is that the alpha value is affected by the number of items in each subscale. This explanation was stated by former researchers [25,26] as a Cronbach  $\alpha$  of smaller than 0.7 is relatively frequent in studies with less than ten items in each subscale or section. Therefore, this relatively low value can be enhanced by raising the number of items in that section. However, in this study, the internal consistency values of the subscales

Domain	Item	Before Deletion		After Deletion	
		Corrected Item-Total Correlation	Cronbach's Alpha after Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Susceptibility $\alpha=0.61$	1- Worried about getting HCV	0.576	0.450	0.613	0.582
	2-"Baby Boomer" more likely to get HCV	0.142	0.630	0.267	0.765
	3-African American more likely to get HCV	-0.003	0.685	Deleted	Deleted
	4- Scared of getting HCV	0.691	0.387	0.460	0.682
	5-Easy to get HCV	0.149	0.651	Deleted	Deleted
	6-Get HCV in the future	0.614	0.475	0.725	0.492
Severity $\alpha=0.61$	1-HCV serious	0.129	0.631	Deleted	Deleted
	2-Severe damage to liver	0.162	0.617	0.204	0.701
	3-Prevent from working	0.165	0.645	Deleted	Deleted
	4-Have a bad effect family	0.450	0.510	0.460	0.573
	5-Might die	0.696	0.400	0.700	0.381
	6- Hard to live	0.480	0.497	0.415	0.600
Benefits $\alpha=0.68$	1-Tell of HCV infection	0.361	0.507	0.328	0.524
	2-Prevent spreading to others	0.585	0.374	0.624	0.278
	3-Can get treatment	0.434	0.484	0.345	0.519
	4- Can be cured	0.229	0.573	0.210	0.649
	5- Helps to protect health	0.168	0.644	Deleted	Deleted
Barriers $\alpha=0.85$	1-Test painful	0.533	0.849	No deletion	No deletion
	2-Miss work	0.796	0.779	No deletion	No deletion
	3-Takes too much time	0.552	0.845	No deletion	No deletion
	4-Makes worry about HCV infection	0.730	0.799	No deletion	No deletion
	5- Costs of HCV test	0.692	0.810	No deletion	No deletion
Norms $\alpha=0.75$	1-People important think should have test	0.607	NA <sup>a</sup>	No deletion	No deletion
	2-People whose opinion you respect think should have test	0.607	NA <sup>a</sup>	No deletion	No deletion

**Table 3:** Primary and Final Reliability of Each of Subscale before and after Deletion of Low-Reliability Items.

<sup>a</sup> Cronbach's alpha cannot be calculated for 1 item subscale

were improved after deletion of certain items, and the Cronbach  $\alpha$  values were enhanced to be more than 0.60. Eventually, all subscales in this questionnaire had a Cronbach  $\alpha > 0.6$ . Therefore, it can be considered that this instrument has an adequate internal validity [27].

As for all items in all sections, the Inter-Item Correlation (IIC) values were relatively lower than the pre-determined value for this study that is 0.8. The probable justification for this is that the resultant score from this questionnaire were (soft measures). It is extremely hard to attain high IIC value as contrasted to the 'hard measures' for instance body mass index (BMI). Thus, one of the choices is to delete the question of low IIC, although if it influences the questionnaire coverage (content validity), hence reconsidering the items before deleting them should be regarded [28,29].

### Conclusion and Future Implications

The results of this study propose numerous outlines of analysis that might be productive for future inquiries. The survey instrument established for the current study should be evaluated with AABBs in different situations. Learning AABBs' perceptions in different areas of the United States using the same survey instrument would give a chance for further evaluation of the reliability of this instrument. The questionnaire might also be reformed and adjusted to study AABBs' behaviors linked to testing for infections other than HCV.

### Acknowledgement

We thank Howard University Hospital authorities represented by Ms. Livingston, for her unlimited assistance in recruiting participants and conducting the study at here venue.

### Declaration of Conflicting Interests

No conflict of interests to declare.

### Funding

The authors declare receiving no financial funding for this research

### Contributorship

All authors have contributed to this publication and hold themselves jointly and individually responsible for the content. No grant did support this research.

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