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Research Article

Psychometric Properties of a Measure Assessing Attitudes and Norms as Determinants of Intention to Use Oral Contraceptives

Jongwon Lee, PhD, RN, [1, *] Mauricio Carvallo, PhD, [2] Taehun Lee, PhD [2]

[1] College of Nursing, University of New Mexico, Albuquerque, NM, USA
[2] Department of Psychology, University of Oklahoma, Norman, OK, USA

S U M M A R Y

Purpose: Asian immigrant and Asian American women are less likely to use oral contraceptives (OCs) and tend to rely on low-efficacy methods of contraception. This contraceptive pattern remains poorly understood, in part, because no theory-driven measurement exists to assess psychosocial determinants essential in explaining behaviors related to OC use in this population. The current study aimed to evaluate the psychometric properties of a measure of attitudes and subjective norms toward OC use among Korean American women as a first step to determine whether the measure can be used in this population and, potentially, in other Asian ethnic groups.
Methods: The sample consisted of 329 Korean immigrant women living in New York City. The theory of reasoned action guided the development of the measure assessing attitudes and norms. Psychometric evaluation included item analysis, internal consistency estimates of reliability, and construct validity (i.e., factorial, discriminant, and predictive).
Results: All item-total correlations were above the recommendation of .30. The Cronbach's alpha for the attitudes and subjective norms measure was .88 and .86, respectively. Exploratory factor analyses revealed four interpretable factors, and confirmatory factor analyses confirmed that the factor structures derived from the exploratory factor analyses fit the data well. Discriminant and predictive validity of the measure were also established.
Conclusions: The study provides support for the validity and reliability of the measure and its use for determining the degree to which Korean immigrant women intend to use OCs.

Introduction

Oral contraceptives (OCs) are the most preferred method of contraception among women in the United States [1,2]. One reason for this popularity is that they not only prevent pregnancy when used consistently and as directed [3,4], but they also provide women with noncontraceptive health benefits, such as a decreased risk of ovarian cancer and relief from troublesome symptoms associated with menstruation [1,5,6]. Despite these benefits, Asian American women are less likely to use them [7] and are more likely to rely on condoms, withdrawal, or rhythm methods as their primary method of contraception compared with other ethnic groups [8-11].

Currently, there are no studies on Asian immigrant women's contraceptive practices and attitudes in the United States (but see ref. 8). However, there is strong reason to believe that their contraceptive patterns are very similar to women living in Asian countries [12]. In Asia, the intrauterine device is one of the most prevalent forms of reversible contraception (29.7%), and only 10% of women report using OCs [12]. Although some regional differences among different Asian countries can be expected, studies show that East Asian countries (e.g., China, Japan, and Korea) have very similar patterns with respect to OC use [13-15]. Among this population, Korean women rank OCs as their least preferred method (2.0%–2.7%) of contraception [15,16]. They instead choose to use less reliable temporary methods of contraception, such as rhythm and withdrawal [16].

The improvement in our understanding of contraceptive use behavior among Asian women in general (including Asian immigrant women) is of particular interest because Asians are the fastest growing racial group in the United States, and Asian immigrants

* Correspondence to: Jongwon Lee, PhD, RN, College of Nursing, University of New Mexico, MSC 07 4380, Box #9, 1650 University Blvd, NE, Albuquerque, NM 87102, USA.
    E-mail address: jwlee@salud.unm.edu

constitute an important segment of this population (74.1% of Asian American adults are immigrants) [17]. According to the U.S. Census Bureau, from 2000 to 2010, the Asian population increased four times faster (45.6%) than the total U.S. population (9.7%) [18]. Similarly, the latest census data show that in 2010, of all new immigrants in the United States, 36% were Asian, compared with 31% who were Hispanic. Among Asian immigrants, Koreans (864,125) represent the seventh-largest immigrant group in the United States. This group has increased by 52% since 1990 [18,19]. There is direct evidence that suggests that their contraceptive use patterns are very similar to their counterparts in Korea [8,20].

From our perspective, research that focuses on Asian immigrant women's contraceptive use behavior (including Korean immigrant women) can contribute to our understanding of contraceptive use behavior in Asian American women, in general. Accordingly, programs and policies designed to prevent and reduce unintended pregnancy in the United States could be strengthened by research that explores how psychosocial factors, such as attitudes and social norms, influence Asian women's choices for OCs (as well as other contraceptive methods) and their willingness to use them [21,22].

Recently, Lee and colleagues conducted a study to explore the relationship between acculturation and psychosocial factors regarding OC use among Korean immigrant women [8]. In this study, a scale was developed to assess Korean immigrant women's attitudes and norms toward OC use. The purpose of the current research was to validate and evaluate the psychometric properties of this scale among Korean women in the United States. This is the first attempt to determine whether the scale can be used as a valid and reliable measure to assess attitudes and norms related to OC use among Korean women and, potentially, other Asian groups.

Theoretical framework

The framework guiding the conceptualization of this study derives from the theory of reasoned action (TRA) [23]. The TRA has been widely used to examine various reproductive health behaviors (e.g., condom use) and applied to various racial and ethnic groups, including Koreans and other Asian groups [24,25]. The TRA corresponds to an expectancy-value model that is useful in the explanation of motivation, expectations, and goals underlying individuals' behaviors [26].

The theory posits that behaviors (e.g., OC use) are predominantly determined by the individual's intention to engage in a particular behavior [26]. Intentions, in turn, are influenced by the attitudes and subjective norms that the individual holds about the certain behavior (e.g., OC) [22]. Attitudes refer to an individual's positive (or negative) evaluation of, or favorable (or unfavorable) feeling about, his or her performing the behavior. Subjective norms refer to an individual's perception that most of his or her important others think that a certain behavior should (or should not) be performed and are determined by the degree to which an individual perceives significant others' expectations of his or her performing the behavior [21]. Both attitudes and subjective norms, separately or in combination, contribute to determining the degree to which people are willing to engage in specific health-related behaviors.

In addition, the relative importance of attitudes and subjective norms to the prediction of intention differs from one person to another, depending on the intention in question. That is, whether a person would intend to perform the behavior in question more under the influence of subjective norms or his or her own attitudinal consideration depends, in part, on the intention under study. For some intentions, attitudes might be more important than subjective norms, whereas for other intentions, subjective norms might be predominant in determining intention [21].

Methods

Instrument development

The standard guidelines suggested by Ajzen and Fishbein [23] were used to develop the items that assess attitudes and subjective norms in this study. First, we conducted a preliminary study to elicit the attitudes and subjective norms related to OC use among Korean immigrant women ($n = 40$) living in Buffalo, New York. The questionnaire used in this elicitation study was composed of seven open-ended questions assessing the general attitudes held by Korean immigrant women. Participants were asked to list their feelings, opinions, and thoughts about OCs and their overall evaluation of using them. They were also asked to list significant individuals or groups who would approve (or disapprove) of their using OCs.

Next, the content of the various emotions, general evaluation, and significant referents emerged from the elicitation study were analyzed and used to construct two subscales with items measuring attitudes and subjective norms. The attitudes subscale consisted of 12 items. Semantic differential scales were used to assess participants' general evaluations or favorableness of OC use. Each item in the attitudes subscale started with the statement, "Using oral contraceptives daily as directed," followed by bipolar adjectives (e.g., unpleasant vs. pleasant). A 7-point scale was used for each pair of adjectives, ranging from -3 (e.g., *extremely unpleasant*) to $+3$ (e.g., *extremely pleasant*). Participants were asked to indicate the point that most accurately reflected their attitudes toward OC use. The responses to each item were summed to evaluate their attitude toward OC use. The subjective norms subscale consisted of seven items assessing individuals' perceived social pressure from significant referents regarding their OC use (e.g., "My parents think that I should use OCs") and was measured on a 7-point scale, ranging from -3 (*extremely unlikely*) to $+3$ (*extremely likely*).

Finally, a panel of seven reviewers established the content validity of the measurement of attitudes and subjective norms. Four of them were experts in the areas of women's health or child health and welfare; three of them were lay Korean women whose characteristics were similar to a sample of the study population. The reviewers were asked to assess each item in the measures, based on whether (a) the items were relevant to the constructs measured, (b) the content of each item was concise and clear, and (c) the response format (e.g., sentence structure, readability, accuracy) of each item was conducive to collecting information on the attributes in question. The reviewers were asked to rate the appropriateness of each item on a 3-point ordinal scale: $1 = $ *unacceptable*, $2 = $ *possibly usable if reworded*, $3 = $ *acceptable*. If any item was rated 1 (*unacceptable*), they were instructed to add comments. One item (i.e., punishing vs. rewarding) was deleted from the attitudes subscale because the majority of the reviewers rated it as unacceptable; another item (i.e., unhealthy vs. healthy) was rewritten to reflect more accurately the construct of attitudes. Content validity indices were calculated across all reviewers' ratings of each item's relevance in the measure. The indices ranged from .91 to 1.00, indicating satisfactory agreement.

Study design

An explanatory cross-sectional design was used in this study to evaluate and validate the psychometric properties of a measure assessing attitudes and subjective norms as determinants of intention to use OCs.

Setting and sample

Two separate samples were used to evaluate the psychometric properties of the attitudes and subjective norms measure. The first sample consisted of Korean women living in New York City (NYC). This sample was recruited using a random sampling procedure and corresponds to a study originally reported by Lee and colleagues [8]. Women were included in this study if they were (a) aged 18–55 years; (b) born in Korea and then came to the United States at age 12 or older; and (c) able to speak and understand the Korean language (for a full description of the sampling procedure, see ref. 8). This initial sample ($n = 145$) proved to be not fully representative of Korean women living in NYC in terms of age and marital status. The majority was older than 30 years of age (96.6%) and married (91.0%). Thus, to minimize the skewed sample distributions and to attain a more representative sample of Korean women living in NYC, 184 additional participants (mostly young and single) were recruited using a convenience sampling procedure among Korean women who frequented the Korean Community Services (KCS) located in Queens, New York. Participants in this convenience sample met the same criteria as participants in the random sample. The combined two samples yielded a total number of participants ($n = 329$) sufficiently large and representative of the study population to adequately test the psychometric properties of the measure.

There are no clear cutoff criteria to determine how large a sample is good enough to conduct a factor analysis. However, Nunnally and Bernstein [27] have suggested that about 10 respondents per variable (10:1 ratio) are needed for obtaining more reliable factor patterns. Similarly, Tinsley and Tinsley [28] have proposed that a ratio of 5–10 subjects per variable, up to about 300 subjects, is adequate to undertake factor analysis and that thereafter, the ratio can be somewhat relaxed. Comrey [29] also suggested that a sample size of 200 is adequate in most ordinary cases of factor analysis involving no more than 40 items. The measure in our study contained a total of 18 items only and thus, a sample size of 329 was determined sufficient for undertaking factor analysis and obtaining stable factor analytic results.

Ethical considerations

Approval to conduct the study was obtained from the Human Research Review Committee at the University of New Mexico.

Data collection

The data were collected in two different ways. In the first sample ($n = 145$), a telephone interview was used to collect data from an initial sample identified via the NYC White Pages. First, a total of 1,494 telephone numbers with Korean surnames were randomly drawn from the White Pages, and 432 women at these telephone numbers (28.9%) were identified as eligible for the study. Of the 432 eligible women, 145 women (33.6%) completed the telephone survey. Each participant took about 20 minutes to complete the survey (for more detailed information of this data collection, see ref. 8). In the second sample ($n = 184$), participants were recruited at the KCS by a bilingual Korean research coordinator who had extensive experience administering survey questionnaires and has been involved in various Korean health-related projects. The research coordinator personally approached women visiting the KCS and determined their eligibility for the study. If they were eligible and agreed to participate, the coordinator asked them to complete the questionnaires in a private room.

Data analysis

Descriptive statistics were used to obtain information about the demographic characteristics of the sample and to examine the mean distributions of the attitudes and subjective norms items. Internal consistency estimates of reliability and item analysis were conducted for both subscales using Cronbach's alphas $\geq .70$ and corrected item-total correlation $\geq .30$ criteria, respectively. As part of the construct validity analysis, we first conducted an exploratory factor analysis (EFA) to determine the underlying structure of the 18 items in the measure of attitudes and subjective norms. The following criteria were used to determine the underlying structure of the measure: (a) eigenvalues ≥ 1.00, (b) scree methods, (c) item-factor loading scores ≥ 0.40, (d) total variance explained, (e) Monte Carlo principal component analysis (PCA) for parallel analysis, and (f) interpretability of the factor solution. In addition, the factor-ability of the data was assessed using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity.

A confirmatory factor analysis (CFA) was then conducted to validate the factor structures derived from the EFA. The model fit was estimated by (a) relative chi-square statistic (χ^2/df ratio), (b) goodness of fit index (GFI), (c) comparative fit index (CFI), and (d) root mean square error of approximation (RMSEA). Although there are no clear cutoff criteria for accepting a model as appropriate, it is generally agreed that (a) a value of χ^2/df less than 3 is acceptable; (b) values of the GFI greater than or equal to 0.90 are indicative of best model fit, and those between 0.85 and 0.90 are acceptable; (c) values of the CFI greater than 0.95 are considered excellent model fit, and those between 0.90 and 0.95 are acceptable; and (d) values of the root mean square error of approximation less than 0.05 indicate excellent model fit, values of 0.05–0.08 are acceptable, and values greater than 1.00 indicate poor fit [30-34].

For both factor analyses, the total sample of 329 was randomly divided into two separate and independent subsamples. The first half of the sample ($n = 165$) was used for the EFA, whereas, the second half ($n = 164$) was used for the CFA. Although this procedure yielded two smaller samples, the sample sizes were still sufficiently large to obtain reliable factor analytic results because the measure in our study contained a total of 18 items only ($> 8:1$ ratio). Finally, one-way multivariate analyses of variance (MANOVAs) were applied for known-group comparisons to determine discriminant ability of the attitudes and subjective norms subscales between OC users and nonusers, and multiple regressions were conducted to assess the predictive ability of these subscales on intention to use OCs.

Results

Sample characteristics

The age of the participants ranged from 18 to 55 years ($M \pm SD$, 33.54 ± 10.40 years). Nearly half (48.9%) of the participants were married, and their length of marital status varied from 6 months to 35 years ($M \pm SD$, 14.43 ± 9.23 years). In addition, 43.2% of the participants had lived in the United States for more than 10 years, 62.9% had completed college or graduate school, and 56.8% were employed. The two random-split samples (on which the EFA and CFA were conducted) did not statistically differ in terms of demographics and scores on the attitudes and subjective norms subscales, indicating that the random-split was appropriate (see Table 1).

Reliability and homogeneity

The item analysis revealed that all items in the attitudes and subjective norms subscales had corrected item-total

Table 1 *Sample Characteristics.*

Characteristics	Total sample	Two random-split samples		p^a
		EFA (n = 165)	CFA (n = 164)	
	$M \pm SD$ or n (%)	$M \pm SD$ or n (%)	$M \pm SD$ or n (%)	
Age (yr, n = 329)	33.54 ± 10.40	33.76 ± 10.34	33.32 ± 10.48	.895
Marital status (n = 329)				
Single	164 (49.8)	80 (48.8)	84 (51.2)	.663
Married	161 (48.9)	83 (51.6)	71 (48.4)	
Other	4 (1.2)	2 (50.0)	2 (50.0)	
Education (n = 326)				
Middle school or lower	8 (2.4)	4 (50.0)	4 (50.0)	.732
High school	79 (24.0)	35 (44.3)	44 (55.7)	
Partial college	14 (4.3)	9 (64.3)	5 (35.7)	
College graduate or higher	207 (62.9)	106 (51.2)	101 (48.8)	
Other	18 (5.5)	9 (50.0)	9 (50.0)	
Employed (n = 329)				
Yes	187 (56.8)	91 (48.7)	96 (51.3)	.535
No	142 (43.2)	74 (52.1)	68 (47.9)	
Religion (n = 326)				
Catholic	62 (18.8)	34 (54.8)	28 (45.2)	.667
Christian	205 (62.3)	100 (48.8)	105 (51.2)	
Buddhism	14 (4.3)	9 (64.3)	5 (35.7)	
None	45 (13.7)	21 (46.7)	24 (53.3)	
No. of children (n = 162)	1.60 ± 0.98	1.57 ± 1.00	1.63 ± 0.94	.310
Language spoken at home (n = 324)				
English only	44 (13.4)	19 (43.2)	25 (56.8)	.094
Korean only	248 (75.4)	131 (52.8)	117 (47.2)	
Both English and Korean	32 (9.7)	11 (34.4)	21 (65.6)	
OC use history				
OC users	64 (19.5)	33 (20.1)	31 (19.0)	.802
Nonusers	263 (79.9)	131 (80.0)	132 (81.0)	
Age on entering the United States (yr, n = 329)	23.81 ± 8.66	24.20 ± 8.38	23.42 ± 8.94	.891
Length of residency in the United States (yr, n = 329)	9.77 ± 7.76	9.60 ± 7.52	9.93 ± 8.01	.127
Measures				
Attitudes	0.70 ± 12.90	0.54 ± 12.05	0.85 ± 13.73	.831
Subjective norms	−0.95 ± 8.02	−0.21 ± 8.01	−1.70 ± 7.97	.092

Note. EFA = exploratory factor analysis; CFA = confirmatory factor analysis.
[a] p for either the Pearson χ^2 or independent-samples t tests.

correlations ≥ .30 [35], except for one item (i.e., SN07) corresponding to the subjective norms subscale, which had a corrected item-total correlation of .17 Thus, we deleted this item from the measure and then estimated internal consistency of reliability for the attitudes (k = 11) and subjective norms (k = 6) subscales. The Cronbach's alpha of these subscales was .88 and .86, respectively.

Exploratory factor structures

An EFA was conducted on the 17 items included in the measure assessing attitudes and subjective norms, using SPSS software (version 21.0; IBM Corp., Armonk, NY, USA). A PCA with varimax rotation was used to identify a set of uncorrelated components in the measure. The mean KMO value was 0.87, ranging from 0.71 to 0.92 [36], and the Bartlett's test was significant ($\chi^2 = 2,809.21$, $df = 136$, $p < .001$). The analysis revealed five factors whose eigenvalues were ≥ 1, accounting for 71.4% of the total variance in the measure. However, inspection of the scree plot and a Monte Carlo PCA for parallel analysis indicated that there should be four factors to be retained. In addition, one item (i.e., SN06) in the subjective norms subscale revealed an item-factor loading score of less than 0.40. Thus, we deleted this item from the measure and set the number of factors to extract at four in SPSS and re-ran the analysis with the remaining 16 items, using the same PCA with varimax rotation. The factor solution revealed the four interpretable factors accounting for 68.3% of the total variance in the measure. As expected, all items in the measure, except one (AT06) in the attitudes subscale, loaded strongly onto the corresponding factor and all item-factor loading scores were greater than 0.40. AT06 cross-loaded onto Factors 1 and 3 with similar loading scores (0.54 and 0.60, respectively), but it was allowed to be loaded onto Factor 1 because it made more theoretical sense in terms of factor interpretability and usefulness (see Table 2).

Model fit testing

A CFA was conducted to determine the degree to which the resultant four-factor model fit the data using AMOS (Analysis of

Table 2 *Exploratory Factor Analysis of a Measure Assessing Attitudes and Subjective Norms.*

Measure	Item	Item content	Factors			
			1	2	3	4
			General attitude	Subjective norms	Cognitive attitude	
					Effectiveness	Usability
Attitudes (AT)	AT01	Bad−Good	**0.80**	0.25	0.05	0.12
	AT02	Harmful−Beneficial	**0.85**	0.12	−0.08	0.07
	AT03	Unhealthy−Healthy	**0.80**	0.13	0.03	0.15
	AT04	Negative−Positive	**0.75**	0.18	0.26	0.13
	AT05	Dangerous−Safe	**0.74**	0.15	0.28	0.06
	AT06	Uncomfortable−Comfortable	**0.54**	0.03	0.60	0.06
	AT07	Unpleasant−Pleasant	**0.56**	−0.09	0.30	0.12
	AT08	Ineffective−Effective	−0.02	0.13	**0.80**	0.22
	AT09	Unreliable−Reliable	0.34	0.11	**0.78**	−0.09
	AT10	Inconvenient−Convenient	0.15	0.06	0.20	**0.82**
	AT11	Difficult−Easy	0.22	0.00	−0.03	**0.84**
Subjective Norms (SN)	SN01	Husband/boyfriend(s)	0.27	**0.75**	0.07	0.01
	SN02	Parents	0.09	**0.83**	−0.11	0.05
	SN03	Friends	0.08	**0.83**	0.11	0.10
	SN04	Family	0.14	**0.84**	0.09	0.09
	SN05	Health care providers	0.04	**0.77**	0.17	−0.16
	Eigenvalues		5.57	2.67	1.39	1.30
	Percentage of variance		25.0	21.5	12.2	9.7
	Cumulative percentage		25.0	46.5	58.6	68.3

Note. Boldface type indicates factor on which item loaded.

Moment Structures; version 21.0). A model was specified in which all items in the measure were allowed to load on the corresponding factor only. All items in the measure were treated as continuous, and maximum likelihood estimation procedure was applied. The initial analysis revealed a somewhat less than adequate fit to the data ($\chi^2/df = 2.55$, GFI = 0.83, CFI = 0.90, RMSEA = 0.10), although a value of the CFI was above the accepted cutoff score (i.e., 0.90). Modification indices (MIs) indicated that the model fit would be substantially improved if error variances for certain items (MI > 1.00) were allowed to correlate with each other. Thus, we allowed the error variances of the following items to be correlated with each other: 1 and 2 (MI = 10.25), 1 and 9 (MI = 13.07), 2 and 3 (MI = 31.67), and 9 and 10 (MI = 15.52). The modified model revealed a significant improvement over the baseline model and appeared to fit the data well ($\chi^2/df = 1.94$, GFI = 0.88, CFI = 0.94, RMSEA = 0.08: see Figure 1).

Known-group comparisons

Known-group comparison refers to an analytic technique used to determine the ability of a measure to discriminate between groups of subjects who are known to be different in terms of specific characteristics being measured [37]. This constitutes another method typically used to support construct validity. In our study, construct validity of the scale was supported if it could discriminate between the mean scores of women who reported they were OC users ($n = 64$) and those who reported they were nonusers ($n = 263$) on the four components that the scale was measuring (i.e., general attitude, effectiveness, usability, and subjective norms). OC users were defined as to those who were currently using or had used OCs for more than a month.

Those who had used OCs for less than a month were considered nonusers. To assess whether this approach was conceptually sound, we tested whether those who had used OCs for less than a month and those who had never used OCs were statistically different from each other. A series of *t* tests revealed that the average scores of general attitude ($p = .517$), effectiveness ($p = .164$), usability ($p = 1.000$), and subjective norms ($p = .530$) between those who had used OCs for less than a month and those who had never used OCs did not statistically differ from each other.

A one-way MANOVA was conducted to determine whether there were differences in the four components of the attitudes and subjective norms measure between Korean immigrant women who were OC users and those who were nonusers. The analysis revealed that there were statistically significant differences in the linear combination of these four dependent variables between the two groups ($F[4, 321] = 10.35$, $p < .001$, Wilks' lambda = 0.89, partial $\eta^2 = 0.11$). When considering the four components separately, a Bonferroni analysis with an adjusted alpha level of 0.013 revealed significant differences between OC users and nonusers in all four components ($F[1, 324] = 30.34$, $p < .001$; $F[1, 324] = 14.13$, $p < .001$; $F[1, 324] = 22.52$, $p < .001$; $F[1, 324] = 13.39$, $p < .001$, respectively). An inspection of the mean scores of the four components indicated that the OC users reported significantly higher levels of positive general attitude, effectiveness, and usability scores, and perceived much more social pressure from referents (see Table 3).

Predictive validity

The predictive validity of the four components (i.e., general attitude, effectiveness, usability, and subjective norms) of the attitudes and subjective norms measure was tested using a criterion assessing women's intention to use OCs. Participants were asked to respond to the statement, "I intend to use oral contraceptives daily as directed" on a 7-point scale, ranging from −3 (*extremely unlikely*) to +3 (*extremely likely*). Zero-order correlations revealed that
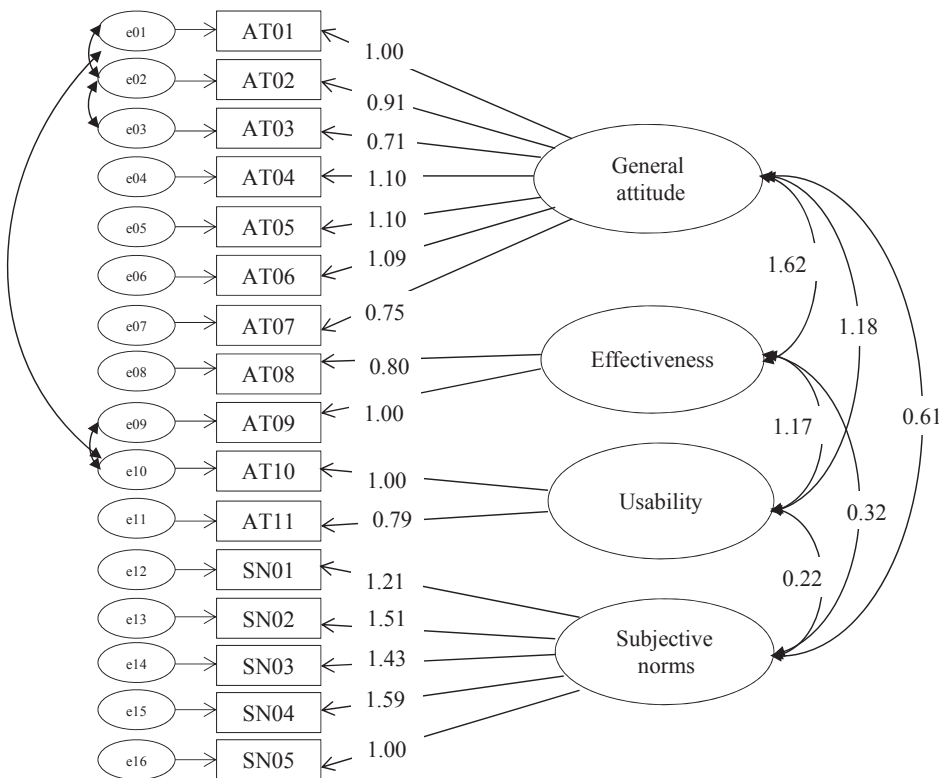

Figure 1. Model of a measure assessing attitudes and subjective norms.
Note. Latent variables: General Attitude, Effectiveness, Usability, Subjective Norms. Observed variables: AT01–SN05. Errors: e1–e16.

Table 3 *Differences in Four Components between Oral Contraceptive Users and Nonusers.*

Components		Groups	M	SD	Mean difference
General attitude		OC users	4.44	8.71	6.88
		Nonusers	−2.44	8.95	
Subjective norms		OC users	2.25	7.90	4.01
		Nonusers	−1.76	7.80	
Cognitive attitude	Effectiveness	OC users	3.65	2.40	1.84
		Nonusers	1.81	2.84	
	Usability	OC users	1.11	3.48	1.74
		Nonusers	−0.63	3.26	

subjective norms ($r = .56$) and general attitude ($r = .44$) exhibited strong associations with intention to use OCs, whereas effectiveness ($r = .24$) and usability ($r = .21$) exhibited small associations with intention to use OCs.

We conducted a multiple regression to determine the ability of these four components to predict OC use intention. This analysis was able to test the unique predictive ability of each single component, controlling for all other components in the model. The linear combination of the four components indicated that the overall model significantly predicted OC use intention, $R^2 = .38$, F [4,322] = 45.50, $p < .001$. However, a review of the regression coefficients indicated that only two components (i.e., general attitude and subjective norms) had significant predictive ability of intention above and beyond each of the other components. The analysis revealed that subjective norms were a much stronger predictor of intention to use OCs ($\beta = 0.47$, $p < .001$) than general attitude ($\beta = 0.26$, $p < .001$). Even when women's OC use history was controlled for, the relative importance of subjective norms ($\beta = 0.45$) over general attitude ($\beta = 0.27$) did not differ. In contrast, effectiveness ($\beta = −0.03$, ns.) and usability ($\beta = 0.05$, ns.) were no longer significant predictors of intention to use OCs when controlling for subjective norms and general attitude.

Discussion

In this study, we tested the psychometric properties of a measure of attitudes and subjective norms underlying OC use intention among Korean immigrant women. Overall, the study provided support for the validity and reliability of the measure and its use for determining the degree to which Korean immigrant women intend to use OCs. The attitudes and subjective norms measure yielded excellent internal consistency reliability results (Cronbach's alphas at .88 and .86, respectively), above the conventional level of acceptable reliability (i.e., .70) for a newly developed scale [27]. Similarly, the homogeneity of the measure (i.e., item-total correlation) was above the standard recommended criterion of .30.

The results of EFAs revealed four interpretable factors in the attitudes and subjective norms measure. The average KMO value (0.87) was above the recommended value of greater than 0.50, supporting the factorability of the correlation matrix. The results of CFAs indicated that the factor structures of the measure derived from the EFA fit the data well, supporting the construct validity of the measure.

Factors 1, 3, and 4 assessed different dimensions of attitudes, whereas Factor 2 assessed a single dimension of subjective norms. Factor 1 consisted of seven items primarily assessing a general affective dimension (e.g., good, comfortable, pleasant, and positive). Thus, this factor was named "general attitude". In contrast, the items in Factors 3 and 4 tapped exclusively into a specific cognitive dimension (e.g., beliefs and knowledge). Factor 3 had two items assessing the attributes related to pregnancy prevention (e.g., effectiveness); thus, it was named "effectiveness". Because Factor 4

consisted of two items assessing attributes related to OC method usage (e.g., convenience), it was named "usability". The distinction between Factor 1 and Factors 3 and 4 is consistent with the view that most attitudes are based on an affective and cognitive attitudinal component [38-40]. Finally, Factor 2 consisted of five items assessing a person's perceived social pressure from significant referents.

Most of the items in the measure loaded exclusively onto their corresponding factors, indicating that they adequately captured their corresponding construct under study. However, AT06 in the attitudes subscale cross-loaded onto more than one factor, with item-factor loading scores of greater than 0.50. Originally, this item was designed to assess women's perspectives on whether OC use made them feel comfortable. Accordingly, it was expected to load onto the factor involving general aspects of attitudes, such as feeling (i.e., general attitude). Nonetheless, it loaded more strongly onto the factor involving a specific cognitive aspect (i.e., effectiveness).

It was unclear why AT06 was highly intercorrelated with ($r = .59$, $p < .001$) and cross-loaded onto the factor with the items assessing the effectiveness of OCs. In health care, comfort and effectiveness are separate concepts and hold distinctive properties. However, in the current study they seem to be inseparable and need to be measured in relation to each other. Possibly, women's levels of perception of how well OCs prevent pregnancy (i.e., effectiveness) might influence the degree to which they could feel comfortable with OC use. That is, perception of the effectiveness of OCs would give Korean women emotional and physical confirmation of not being pregnant. This might, in turn, lead them to feel comfortable or uncomfortable with using OCs. Needless to say, this explanation is highly speculative. Further research is warranted.

Known-group comparisons confirmed that all four components in the attitudes and subjective norms subscales were able to detect significant differences between the OC users and nonusers. In particular, the general attitude component demonstrated the strongest discriminant (known-group) validity between the two groups than did the subjective norms subscale. Women who were currently using or had used OCs for longer periods (> 1 month) tended to have a more positive evaluation of and emotional feeling toward OC use and to perceive more pressure to use OCs from their significant referents than did those who had never used OCs or had used them for short periods. These findings are consistent with previous studies that have shown that whether or not women have had experience using contraceptives is an important factor in shaping such attitudes and subjective norms [41,42].

Tests of the predictive ability of the four components in the model revealed that only general attitude and subjective norms were uniquely able to predict OC use intention. In addition, the results suggested that subjective norms were a stronger predictor than general attitudes ($\beta = 0.47$ and $\beta = 0.26$, respectively). This finding is consistent with past research that shows that for some health behavior (e.g., condom use), subjective norms are a better predictor of intention than are attitudes [43]. This finding is particularly important because determining what component is dominant in guiding intention to use OCs among Asian women can influence future intervention programs designed to promote the use of OCs among this population.

Finally, it is important to address limitations of this study. First, psychometric testing of the attitudes and subjective norms measure was limited to only Korean women living in NYC. Thus, the findings might not be generalizable to other ethnic groups living in other areas of the United States. Further validity testing and refinement studies need to be conducted to establish a cross-culturally appropriate measure among other Asian American women (e.g., Chinese) whose cultural norms and OC use patterns

are similar to those of Koreans. Second, the sample sizes of the two groups (i.e., OC users [$n = 64$] and non-OC users [$n = 263$]) compared for known-group validity were markedly unequal. Because of the unequal sample sizes, the findings of known-group comparisons between these two groups should be cautiously interpreted.

To address this second limitation, we ran additional analyses to rule out the possibility that such a small sample would result in different outcomes. First, we randomly selected two groups of 64 participants from the 263 non-OC users to create sample sizes equivalent to the OC users (i.e., OC users [$n = 64$] and non-OC users [$n = 64$]). Next, we ran the same MANOVAs used in the known-group comparison. These results did not alter the original discriminant validity of the measure. Rather, they revealed an increase in the statistical power between the two-group comparisons (partial $\eta^2 = 0.15−0.19$).

The current study also had some notable strengths. For instance, we were able to use two separate subsamples for the EFA and CFA (as recommended) to ensure cross-validation of the attitudes and subjective norms measure in the study. Moreover, the sample size for each analysis was sufficiently large to obtain reliable factor analytic results, making it unlikely that the factor structures derived by EFA were due to chance and more likely that the model fit results were due to true improvement in the model.

Conclusion

This study shows that the attitudes and subjective norms measure is reliable and valid for assessing Korean immigrant women's attitudes and norms toward OC use. To our knowledge, this is the first attempt to develop and test a theory-based measure assessing attitudes and norms related to OC use. Such a reliable and valid measure is needed for designing and implementing culture-specific interventions that can strengthen positive perceptions and enhance acceptability of OCs, which will ultimately lead to reducing unintended pregnancies in this population. Further research is needed that includes different samples varying in demographic characteristics to establish the cross-cultural equivalence of the measure.

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