A Reasoned Action Approach to Physicians' Utilization of Drug Information Sources

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Purpose. The effects of attitude and subjective norm were investigated on physicians' intention to use seven drug information sources: the PDR, medical textbooks, medical journals/newsletters, pharmaceutical manufacturers' literature, pharmaceutical manufacturers' representatives, other physicians, and pharmacists. The effects of past behavior and practice characteristics were also examined.

Methods. An eight-page mail questionnaire queried health maintenance organization physicians on their intention to use, attitude (emotional response) and subjective norm (colleagues' approval/disapproval) toward use of each source when searching for drug information on a fictitious, new H_2 antagonist agent.

Results. Responses were received from 54% (108) of the 200 physicians surveyed. Positive attitudes toward use had the greatest influence upon intention to use each of the sources ($b \geq .40$) (except for pharmacists, for which subjective norm was the most important predictor ($b = .31$)). Past behavior directly affected intention to use the PDR ($b = .27$), and pharmaceutical manufacturers' literature ($b = .26$). The effects of attitude and/or subjective norm on intention to use non-commercial sources of drug information were moderated by the practice characteristics.

Conclusions. These findings suggest that physicians' use of drug information sources is strongly influenced by their attitudes toward use. In addition, the importance of situational contingencies should not be overlooked when investigating the use of drug information sources.

KEY WORDS: drug information sources; physician; theory of reasoned action; health maintenance organization.

INTRODUCTION

A relationship appears to exist between types of drug information sources used by physicians and rationality of drug prescribing (1,2). The lack of appropriate drug information has been suggested as a possible cause of improper prescribing (2). Many studies describing physicians' use of drug information sources are descriptive, thus limiting our understanding of why specific sources are utilized (3,4). In addition, these studies have lacked statistical rigor and a conceptual framework in which to guide the investigations (5,6).

Previous studies have reported differences in physicians' use of drug information sources depending upon the newness of the information sought (7–10). Lilja proposed that physicians chose drugs through habit unless confronted with a new drug (7). In general, commercial sources (pharmaceutical manufacturers' representatives and promotional literature, the PDR) have been found to be leading sources of new drug information, while non-commercial sources (medical journals, physician colleagues, medical textbooks, pharmacists) are cited for information on older drugs and actual prescribing decisions (8–10). In addition, physicians reportedly use more than one source of information when arriving at a prescribing decision (11). Linn and Davis suggest that the physician preferences for sources of new drug information are significantly related to their attitudes and beliefs about drugs in general (12). Physicians preferring non-commercial sources are more likely to express conservative attitudes as to when drugs should be used, and are significantly less likely to feel that information from commercial sources is acceptable (12).

Physicians' practice characteristics also influence the selection of drug information sources (13). Peay and Peay found that non-commercial sources are more likely to be used by specialists than general practitioners (10). Other studies have shown that physicians in group practices and those who were "better" prescribers consult other physician colleagues more often than solo practitioners or "poorer" prescribers for information on new drugs (1,2). "Better" prescribers also sought information on harmful effects and used sources that were revised and expanded frequently. These prescribers felt that pharmaceutical manufacturers' representatives were not good sources of prescribing information about new drugs. Practice characteristics such as experience with similar drugs, the number of other physicians at the primary practice site, and the number of patients seen daily may also moderate physicians' patterns of usage of drug information sources, and therefore influence drug prescribing.

THEORETICAL RATIONALE

Although many factors have been identified that may influence the physician's choice of drug information sources, a cohesive theory is lacking with regard to how these decisions are made. We hypothesize that the framework for choosing drug information sources is similar to the conceptual framework for making drug prescribing decisions. There are two viewpoints advocated for describing how drug prescribing decisions are made: the cognitive model and the habitual model (14). The cognitive model posits that prescribing is an actual problem-solving process directed at achieving outcomes consciously decided upon by the prescriber (15). The cognitive model has been found to be a useful framework for predicting and explaining drug prescribing decisions (16). The habitual model states that the prescribing process is often nondeliberative and that it involves learned responses. This perspective has been supported by anecdotes and conventional wisdom (7). Conclusive empirical support is lacking for both the cognitive and habitual models. The dissemination of prescribing information to physicians is a complex process, and it may be possible that more than one model is needed to describe the prescribing process under differing conditions.

Despite the lack of consensus regarding the best framework to describe prescribing practices, the notion that a physician's decision making process is influenced by cognitive and habitual factors can guide research into how drug information sources are used. Thus, a framework that is based on cognitive theory, but includes the modifying influence of past behaviors, appears

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to be a useful approach to better understand how physicians choose drug information sources.

The theory of reasoned action is an extensively researched cognitive model that has proven successful in predicting and explaining behavioral intentions across a wide variety of domains (17). The theory hypothesizes that individuals are in control of their behaviors. Action is a function of one's intentions (i.e., decision making), which in turn, are a function of (a) attitudes (i.e., one's overall evaluative reactions toward the action) and (b) subjective norms (i.e., perceived social pressure) to perform the action. The hypothesized relations can be tested statistically through multiple regression analysis (17). The key relationships are expressed by the following equations:

$$B = \alpha_1 + \beta_1 I + e_1$$

$$I = \alpha_2 + \beta_2 A_{act} + \beta_3 SN$$

where: B = actions or behavior, I = intention to act, A_{act} = attitude toward the act, SN = subjective norms toward use and α, β, and e are intercept, regression, and error terms, respectively.

An attribute not included in the theory of reasoned action that is worth examination is past behavior or habit. Bagozzi proposed a model in which habit affected behavioral intention (18). Bentler and Speckart found that past behavior and attitude accounted for a high degree of behavior over intentions in a sample of college students' regarding use of alcohol and drugs (19). Landis, Triandis, and Adamopoulos suggest that when old and well established behaviors are in use, attitudes may have little effect on behavior (20). Past behavior may be a component of physicians' use of drug information sources. It is possible that physicians automatically use or rule out a particular source when searching for information on new drugs. Alternatively, attitudes, subjective norms, and past behavior may constitute parallel causes of decisions to use specific drug information sources.

OBJECTIVES

The purpose of this research was to use a well-known theoretical framework, the Theory of Reasoned Action, to examine why physicians use different sources of drug information to aid in their prescribing decisions. The context of the study was the utilization of resources when seeking information about a new drug product. The specific objectives of this study were to determine 1) the effects of attitudes and subjective norms on physicians' intention to use various drug information sources; 2) if past behavior has an effect on physicians' intention to use various sources of drug information; and 3) if selected practice characteristics (number of patients started on a similar drug during the past month, number of patients seen daily, and number of other physicians at the primary practice site) moderate the effects of attitude and subjective norm toward use on intention to use various sources of drug information. According to the Theory of Reasoned Action, favorable attitudes and colleague approval should increase intention to use drug information sources.

METHODS

Previous research into physicians' use of drug information sources has been hampered by two aspects of the research designs used. First, most studies have sampled physicians across a wide variety of specialties. This provides descriptive data on differential use of information sources across specialties, but the practice has been, when testing functional or predictive relations concerning the determinants of information utilization, to pool physicians across specialties in the regression of use on determinants of use. In effect, the regression analyses have assumed homogeneity across physicians, when in fact the samples, and presumably the behaviors, are heterogeneous. To avoid this problem and gain a measure of control, we focus in the present research on a relatively homogenous group of physicians.

A second limitation with most studies to date is that physicians have been asked where they turn to for information "in general." Because each respondent has an idiosyncratic source in mind unknown to the researcher, it is impossible to draw definitive conclusions from the findings. To control for such confounding, we use, as a stimulus, a single, well-defined drug class for all respondents (H_2 antagonists). Hence our research addresses information use with respect to a known drug, which in this case was chosen to be representative of a wide category of medications. A fictitious drug from this class would allow for the examination of information seeking behavior without the influence of prior knowledge. This measure of control also increases internal validity in the test of our theory.

In 1991, an eight-page mail questionnaire and cover letter were sent to physicians in a health maintenance organization (HMO) who would be most likely to have used H_2 antagonists during the previous month. The HMO served approximately 43,000 patients and had as members approximately 352 primary care physicians (including pediatricians) and 1051 specialists. The sample group included all physicians practicing in family/general practice (100), internal medicine (75), and gastroenterology (25). In addition, the HMO did not have a restricted drug formulary; therefore, the physicians in the study could prescribe any drug. One month later, a replacement questionnaire and cover letter were sent to all non-respondents. To motivate respondents, the physicians were invited to participate in a drawing for a dinner for two on receipt of the completed questionnaire.

Seven frequently used drug information sources were investigated: the Physicians Desk Reference (PDR); medical textbooks; medical journals/newsletters; pharmaceutical manufacturers' literature; pharmaceutical manufacturers' representatives; other physicians; and pharmacists. These sources were chosen because they represent a variety of commercial and non-commercial sources. Physicians' intention to use, attitude, and subjective norm toward use of the sources were evaluated using a short scenario describing a fictitious, new H_2 antagonist, Tionidine, that had been recently released for use in the United States. The naming of a specific, albeit fictitious, agent in a well-established therapeutic class of medications provided the situational context physicians were to use when searching for drug information.

For each information source, physicians were asked to express their emotional response to using (attitude), the perceived likelihood that they would use it (intention to use), and their perceived colleagues' approval/disapproval (subjective norm) for obtaining information on Tionidine. Past behavior regarding use of the drug information sources was also obtained.

Seven-point semantic differential scales were used to measure the variables (See Appendix A).

Information was also collected on characteristics of the physicians' practices. Specifically, physicians were asked to estimate the number of patients they had started on a H_2 antagonist during the past month, the number of other physicians at their primary practice site, and the number of patients seen daily.

DATA ANALYSIS

The relationships in this study were tested through hierarchical multiple regression analysis. A method recommended by Johnson was used to test for moderating effects (21). First, intention was regressed on attitude and subjective norms. Second, past behavior was added as an additional independent variable. Regression coefficients were used to assess the significance of each variable in explaining the variance in intention. To examine the moderating effects of the practice characteristics, the sample was split on the median by physicians' responses to each characteristic (to provide groups that were as equal as possible in size) and the aforementioned regression models were analyzed on each half of the sample. This was done to determine which coefficients were different across the median split. Subsequently, dummy variable regression was performed on the entire sample to test for actual significant differences between the coefficients.

Dummy variable regression can be used to determine if means (intercepts) in a regression equation are significantly different from one another (21). This procedure provides a more stringent test of the difference between two means than a t-test. Interaction terms created with dummy variables can be used to determine significant differences between regression coefficients (slopes) (21). This provides for a simultaneous test of the difference between two regression coefficients, which is typically determined by the significance of each coefficient separately. Using the median split, a dummy variable (X_1) was created for the number of patients started on H_2 antagonists during the past month ($1 = \leq 10$, $0 = \geq 11$); the number of patients seen daily ($1 = \leq 21$, $0 = \geq 22$); and the number of other physicians at the primary practice site ($1 = \leq 3$, $0 = \geq 4$). The following equation was estimated to test for differences in the intercept:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + e$$

where:

β_0	intercept when $X_1 = 0$
β_1	difference in intercepts
X_1	0 or 1
β_2	common slope for both groups
$X_2 + \ldots$	independent variables

If β_1 is significant, the means (intercepts) between two groups will be significantly different from one another.

To test for differences in the regression coefficients, the coefficients from the multiple regression analyses of each split sample were examined for pairs of coefficients in which one was significant but the other was not. When this occurred, an interaction term was created by multiplying the dummy variable by the variable of interest, and the following equation was estimated:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \ldots + e_i$$

where: β_0, β_1, X_1 & X_2; as before

β_2	Slope when $X_1 = 0$
β_3	difference in slopes
X_1X_2	interaction term

If β_3 is significant, then the regression coefficients (slopes) of the variable of interest will be different from one another.

Finally, the data were examined for anomalies. Scatterplots of the standardized residuals did not indicate problems with non-normality, autocorrelation or heteroscedasticity. Multiple comparisons were not problematic in this analysis since initial *F* tests on the regression equations which contained dummy variables were significant. This indicates that all other tests of significance are "protected" due to the significance of the initial *F* test (22). A significance level of 0.10 was used for all analyses.

RESULTS

The original mailing to these physicians and one follow-up mailing yielded an overall response rate of 54% (108/200 physicians). Although this response rate compares favorably with previous surveys of physicians (23), the available demographic information on non-respondents (type of practice) was compared to respondents to determine non-response bias. Significant differences were not found in the distribution of type of practice between those physicians who responded and those who did not respond ($\chi^2 = 4.07$, df = 2, p = 0.25). In addition, following the method recommended by Churchill to test for non-response bias (24), t-test comparisons between early and late respondents on the practice characteristics also did not reveal any significant differences. The respondents graduated from medical school on average 19.9 (SD = ±11.0) years earlier (range 4–46 years). Males comprised 83% of the sample. The respondents cared for an average of 23.9 (SD = ±13.4) patients daily. They practiced with a mean number of 8.6 (SD = ±16.9) other physicians, and had started 13.4 (SD = ±12.5) patients on H_2 antagonists during the previous month. General descriptive information is reported elsewhere (25).

Determinants of Intention

The results indicated that the physicians' attitudes, and subjective norms had differing effects on their intention to use the sources for drug information when prescribing the new drug (see Table 1). Included in the tables are standardized regression coefficients so that effects within each equation could be compared. Attitude was found to be the only significant, positive predictor of intention to use the majority of sources (Table 1). Attitude and subjective norm predicted intention to use pharmaceutical manufacturers' literature and representatives. Only subjective norm predicted intention to use pharmacists. Past behavior, when added to the equation (but not shown in Table 1), was a significant predictor (b = .27) along with attitude for intention to use the PDR, and intention to use pharmaceutical manufacturers' literature (b = .26). With the addition of past behavior, subjective norm was no longer a significant predictor of intention to use pharmaceutical manufacturers' literature. Next, the moderating effects of the practice characteristics were examined.

Table 1. Effects of Attitude and Subjective Norm on Intention[a]

	Theory of Reasoned Action[b]				
Information Source	I N[c]	=	A_{act} β[d]	+ SN β	R^2
Physicians' Desk Reference	85		.40*** (.32)[e]	−.01 (−.01)	.10***
Medical Textbooks	87		.45*** (.37)	−.10 (−.11)	.11***
Medical Journals/ Newsletters	87		.49*** (.43)	.10 (.13)	.24***
Pharmaceutical Manufacturers' Literature	89		.56*** (.51)	.19* (.19)	.40***
Pharmaceutical Manufacturers' Representatives	89		.66*** (.62)	.18** (.18)	.53***
Physician Colleagues	87		.41*** (.36)	.05 (.07)	.14***
Pharmacists	83		.15 (.17)	.31*** (.38)	.21***

[a] *p ≤ 0.10; **p ≤ 0.05; ***p ≤ 0.01.
[b] I = Intention to Use; A_{act} = Attitude; SN = Subjective Norm.
[c] N's are less than 108 due to listwise deletion of missing data.
[d] β = Unstandardized regression coefficient.
[e] Standardized regression coefficients are in parentheses.

Number of Patients Started on H_2 Antagonists

The means (intercepts) and regression coefficients (slopes) of the interaction terms obtained from the dummy variable regressions were examined to determine the moderating effects of the number of patients started on a H_2 antagonist during the past month on intention (see Table 2). As shown in Table 2, the intercepts and regression coefficients that were significantly different between the subgroups are footnoted with one or more "plus" (+) signs. The mean levels of intention to use each of the sources of drug information across the split samples were not significantly different from one another. Only one pair of the regression coefficients across the split samples on intention to use was statistically different: subjective norm toward the use of the pharmacist (b = .56) was greater for physicians who started ≥11 patients on a H_2 antagonist than for those who started fewer patients (b = .14) (see Table 2). The addition of past behavior to the above analyses did not change the aforementioned results.

Number of Patients Seen Daily

Once again, significant differences between the mean levels of intention to use were not found with this practice characteristic and any of the drug information sources (see Table 3). The analyses of the regression coefficients of the interaction terms of the individual components across the split samples showed that attitude had a more positive effect on intention to use medical journals/newsletters and pharmacists for those physicians who saw ≥22 patients daily. These same physicians felt more colleague approval on intention to use pharmacists, than those physicians who examined fewer patients (see Table 3). For physicians who examined ≤21 patients daily, past behavior was a negative predictor of intention to use medical journals/newsletters (b = −.24), but it did not have an effect for those who saw ≥22 patients (b = −.01) (not shown in table).

Number of Other Physicians at Practice Site

Once again, significant differences were not found between the groups on mean levels of intention to use any of the sources of drug information (see Table 4). But, the moderating effects of this practice characteristic could be seen when examining differences in attitude for physician colleagues and pharmacists; and for subjective norm for medical textbooks and medical journals/newsletters. The effects of subjective norm on intention to use medical textbooks (b = .17) was not significant, and the effects on medical journals/newsletters (b = .28) was positive for those who worked with ≤3 physicians (Table 4). For this same group, the effects of attitude on intention to use physician colleagues was positive (b = .59), but the effect of attitude on intention to use pharmacists was negative (b = −.04) and not significant. The addition of past behavior to the above analyses did not alter any of the previous results.

While not specified in the objectives, years since graduation from medical school was assessed to determine if it moderated the effects of past behavior on intention to use the various sources of drug information. It is hypothesized that the effects of habit or past behavior may be more important the longer a physician is in practice. However, these analyses revealed that years since graduation from medical school did not moderate the effects of past behavior on intention to use any of the drug information sources.

DISCUSSION

The purpose of this study was to use a well-known theoretical framework, the Theory of Reasoned Action, to examine why physicians use different sources of drug information. Specifically, we investigated the effects of attitudes, subjective norms and past behavior on intentions to use various commercial and non-commercial sources. In addition, the moderating effects of several practice characteristics were examined.

The amount of variance (R^2) explained by the various regression models in intentions, attitudes, and subjective norms ranged from 10–68 percent (see Tables 1–4). In general, the greatest amount of variance was explained by the predictors of intentions to use pharmaceutical manufacturers' representatives and literature.

When examining the determinants of intentions, attitudes were found to be the most important predictor of physicians' intentions to use all sources of drug information, except for the use of pharmacists. These results indicate that positive evaluative responses play a particularly important role in the selection of many drug information sources, but colleague approval is more important in the use of pharmacists. In order for physicians to make greater use of pharmacists, efforts should be focused on improving the overall perception of pharmacists as useful sources of drug information in the eyes of physicians. This can be accomplished by increasing the visibility of pharmacists through more decentralization and contact between pharmacists and physicians.

Physicians' past behaviors seemed to play a particularly important role in the use of two well-established, but "less desirable" commercial sources of drug information (PDR and

Table 2. Moderating Effects of the Number of Patients Started on H_2 Antagonists During the Past Month on Intention to Use[a,b]

Information Source	N[d]	Median Split[e]	Mean (SD)	Theory of Reasoned Action[c] I = A_{act} + SN β[f]	R^2
	50	≤10	4.8	.35*	.04	.10*
Physicians' Desk			±1.9	(.29)[g]	(.05)	
Reference	35	≥11	5.6	.29	.01	.06
			±1.8	(.24)	(.01)	
	51	≤10	5.2	.46***	−.10	.12**
Medical			±2.0	(.38)	(−.10)	
Textbooks	36	≥11	5.4	.42*	−.10	.10
			±2.0	(.34)	(−.11)	
	53	≤10	6.2	.39***	−.01	.16***
Medical Journals/			±1.1	(.40)	(−.02)	
Newsletters	34	≥11	5.6	.52**	.20	.29***
			±1.9	(.41)	(.22)	
Pharmaceutical	53	≤10	4.2	.62***	.08	.37***
Manufacturers'			±2.0	(.55)	(.08)	
Literature	36	≥11	4.5	.53**	.30**	.48***
			±1.7	(.51)	(.32)	
Pharmaceutical	53	≤10	3.4	.72***	.14	.58***
Manufacturers'			±2.1	(.67)	(.14)	
Representatives	36	≥11	4.2	.54***	.23*	.39***
			±1.8	(.51)	(.24)	
	52	≤10	5.6	.28	.10	.08
Physician			±1.3	(.22)	(.13)	
Colleagues	35	≥11	5.8	.53***	.02	.27***
			±1.4	(.51)	(.02)	
	51	≤10	5.1	.26**	.14	.15***
Pharmacists			±1.5	(.30)	(.17)[+]	
	32	≥11	4.9	−.03	.56***	.44***
			±1.6	(−.03)	(.68)[+]	

[a] *$p \leq 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$.

[b] Significant differences between subgroups are denoted with plus signs; $^{+}p \leq 0.10$ between ≤ 10 ≥ 11; $^{++}p \leq 0.05$ between ≤ 10 ≥ 11; $^{+++}p \leq 0.01$ between ≤ 10 ≥ 11.

[c] I = Intention to Use; A_{act} = Attitude; SN = Subjective Norm.

[d] N's are less than 108 due to listwise deletion of missing data.

[e] Based on median value of the number of patients started on H_2 antagonists during the past month.

[f] β = Unstandardized regression coefficient.

[g] Standardized regression coefficients are in parentheses.

manufacturers' promotional literature). Past behavior and attitudes affected intentions to use both of these sources. In addition, the influence of past behavior was not moderated by years since graduation from medical school. Depending upon the type of information needed, a combination of cognitive and habitual viewpoints of drug prescribing may provide a good explanatory framework for physicians' use of certain commercial sources of drug information. It is likely that physicians will either rely on past behavior or go through a problem-solving approach when searching for new drug information. Efforts to encourage physicians to use "more desirable" sources will need to overcome the effects of habit.

The effects of attitude and/or subjective norms on intention to use each of the non-commercial sources of drug information were moderated by practice characteristics. Working with fewer colleagues positively increased the effects of attitude on intention to use physician colleagues, while working with more colleagues and caring for more patients positively influenced the effects of attitude on intention to use pharmacists. Working with fewer colleagues translates into a more positive attitude towards intentions to use their colleagues. On the other hand, those physicians who worked in larger practices or cared for more patients felt more positive toward the use of pharmacists. These findings suggest that pharmacists should market their services to larger and busier practices to increase the likelihood of their use.

Turning to the influence of colleagues' approval/disapproval on intention to use the various sources of drug information, working with a greater number of colleagues had differing effects on intention to use medical journals/newsletters and medical textbooks. It negatively influenced the effects of subjective norm on intention to use medical textbooks, and it did not have an effect on the influence of subjective norm on intention to use medical journals/newsletters. It is not clear why having more colleague approval would lead to decreased intention to use textbooks for those physicians working with more colleagues. Future research needs to more fully investigate this relationship.

Finally, having greater familiarity with H_2 antagonists and caring for a larger number of patients daily positively increased

Table 3. Moderating Effects of the Number of Patients Seen Daily on Intention to Use[a,b]

Information Source	N[d]	Median Split[e]	Mean (SD)	Theory of Reasoned Action[c] I = A_{act} + SN β[f]	β	R^2
	46	≤21	5.0	.36**	−.06	
Physicians' Desk			±1.8	(.34)[g]	(−.08)	.09
Reference	36	≥22	5.4	.35	.05	
			±2.0	(.26)	(.07)	.08
	46	≤21	5.3	.38	−.04	
Medical			±1.8	(.31)	(−.05)	.09
Textbooks	38	≥22	5.4	.54***	−.16	
			±2.2	(.46)	(−.16)	.17**
	46	≤21	6.1	.14	−.02	
Medical Journals/			±1.3	(.13)$^{+++}$	(−.03)	.02
Newsletters	38	≥22	5.9	.78***	.16	
			±1.8	(.64)$^{+++}$	(.19)	.53***
Pharmaceutical	47	≤21	4.0	.62***	.23*	
Manufacturers'			±1.9	(.54)	(.22)	.46***
Literature	39	≥22	4.6	.48***	.13	
			±1.9	(.47)	(.14)	.32***
Pharmaceutical	47	≤21	3.6	.87***	.10	
Manufacturers'			±2.1	(.75)	(.10)	.65***
Representatives	39	≥22	3.8	.55***	.17	
			±2.0	(.56)	(.18)	.43***
	47	≤21	5.5	.25	.06	
Physician			±1.3	(.20)	(.08)	.06
Colleagues	37	≥22	5.7	.52***	.07	
			±1.5	(.48)	(.09)	.24***
	43	≤21	5.2	.01	.16	
Pharmacists			±1.4	(.01)$^{+}$	(.17)$^{+}$	.03
	37	≥22	4.5	.25**	.38***	
			±1.7	(.30)$^{+}$	(.49)$^{+}$	.39***

[a] *$p \leq 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$.
[b] Significant differences between subgroups are denoted with plus signs; $^{+}p \leq 0.10$ between ≤21 ≥22; $^{++}p \leq 0.05$ between ≤21 ≥22; $^{+++}p \leq 0.01$ between ≤21 ≥22.
[c] I = Intention to Use; A_{act} = Attitude; SN = Subjective Norm.
[d] N's are less than 108 due to listwise deletion of missing data.
[e] Based on median value of the number of patients seen daily.
[f] β = Unstandardized regression coefficient.
[g] Standardized regression coefficients are in parentheses.

the effects of subjective norm on intention to use pharmacists. Once again, for busier physicians, greater colleague approval translates into greater intention to use pharmacists.

Several limitations should be noted when examining the results of this study on physician's use of drug information sources. First, this study provided a specific context (use of H_2 antagonists), for a specific group of health maintenance organization physicians to think about when searching for information on new drugs. The findings from this context or group of physicians may not be generalizable to all groups or uses of drug information sources. However, examining physicians' use of drug information sources in this manner provides greater specificity and control for the analyses, which leads to a clearer understanding of the process. Second, differences between the specialty groups of practitioners could not be investigated due to the sample size. Nevertheless, meaningful comparisons were made for the entire group on many factors. Finally, the results of this study relied on self-report data. Information on the actual use of drug information sources and the prescribing of H_2 antagonists would have allowed for a more precise determination of the relationship between the use of drug information sources and prescribing in this group of physicians.

CONCLUSIONS

A theoretical framework based on the Theory of Reasoned Action, as well as modifications to the theory based on the addition of past behavior and situational contingencies, proved useful when investigating why physicians' use different sources of drug information. Favorable attitudes toward the source played a particularly important role in intentions to use each of the seven sources of information, except for pharmacists in which subjective norms were the most important predictors. Past behavior directly influenced intention to use commercial sources of drug information (the PDR and pharmaceutical manufacturers' literature). The number of other physicians at the primary practice site, the number of patients seen daily, and the use of similar drugs moderated the effects of attitude and/

Table 4. Moderating Effects of the Number of Other Physicians at Primary Practice Site on Intention to Use[a,b]

Information Source	N[d]	Median Split[e]	Mean (SD)	Theory of Reasoned Action[c] I = A_{act} + SN β[f]	R^2
	34	≤3	5.2 ±2.2	.38 (.24)[g] / −.03 (−.04)	.05
Physicians' Desk Reference	48	≥4	5.2 ±1.6	.35** (.35) / .03 (.05)	.14**
	35	≤3	5.5 ±2.0	.41* (.32) / .17 (.18)+++	.16*
Medical Textbooks	49	≥4	5.2 ±1.9	.57*** (.50) / −.36** (−.38)+++	.20***
	35	≤3	5.8 ±1.8	.54** (.40) / .28* (.30)++	.37***
Medical Journals/ Newsletters	49	≥4	6.1 ±1.2	.33** (.35) / −.03 (−.04)++	.12*
	36	≤3	4.7 ±2.0	.53*** (.45) / .16 (.15)	.28***
Pharmaceutical Manufacturers' Literature	50	≥4	4.0 ±1.8	.61*** (.55) / .19 (.20)	.46***
	36	≤3	4.3 ±1.8	.52*** (.52) / .09 (.10)	.31***
Pharmaceutical Manufacturers' Representatives	50	≥4	3.3 ±2.1	.86*** (.71) / .19* (.18)	.68***
	35	≤3	5.8 ±1.4	.59*** (.62)+ / .04 (.05)	.39***
Physician Colleagues	49	≥4	5.5 ±1.4	.15 (.11)+ / .08 (.10)	.03
	34	≤3	4.8 ±1.7	−.04 (−.04)++ / .38*** (.45)	.20**
Pharmacists	46	≥4	5.1 ±1.3	.43*** (.47)++ / .13 (.16)	.32***

[a] $*p \leq 0.10$; $**p \leq 0.05$; $***p \leq 0.01$.

[b] Significant differences between subgroups are denoted with plus signs; $^{+}p \leq 0.10$ between ≤3 ≥4; $^{++}p \leq 0.05$ between ≤3 ≥4; $^{+++}p \leq 0.01$ between ≤3 ≥4.

[c] I = Intention to Use; A_{act} = Attitude; SN = Subjective Norm.

[d] N's are less than 108 due to listwise deletion of missing data.

[e] Based on median value of the number of other physicians at primary practice site.

[f] β = Unstandardized regression coefficient.

[g] Standardized regression coefficients are in parentheses.

or subjective norms on intention to use non-commercial sources of drug information. Additional research should be conducted in other contexts with different types of physicians to further generalize the findings of this study.

APPENDIX A: QUESTION FORMAT USED TO MEASURE ATTITUDES, SUBJECTIVE NORMS, INTENTIONS, AND PAST BEHAVIOR

Attitude

Now we would like to measure your emotional feelings toward each source of information. Please express how *positive* or *negative* you are towards each if you were to use them anytime during the next month for obtaining information on Tionidine:

[Drug Information Source]

negative feeling 1: 2: 3: 4: 5: 6: 7: positive feeling

Subjective Norm (Reverse Scored)

For each of the following possible sources of drug information on Tionidine, please express whether physician colleagues whose opinions you value would approve or disapprove of your using the source during the next month:

Physician collagues whose opinions I value would approve-disapprove of me using the following sources

[Drug Information source] approve 1: 2: 3: 4: 5: 6: 7: disapprove

Intention to Use (Reverse Scored)

If you were to need information on Tionidine anytime during the next month, please express the perceived likelihood that you would use each of the following sources:

[Drug Information Source]

likely would use	1: extremely	2: quite	3: slightly	4: neither	5: lightly	6: quite	7: extremely	likely would not use

Past Behavior

Please express how frequently you have used each of the following during the past month for obtaining information on drugs:

[Drug Information Source]

infrequently						frequently
1: extremely	2: quite	3: slightly	4: neither	5: slightly'	6: quite	7: extremely

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