The Theory of Planned Behavior: A Review of its Applications to Health-Related Behaviors

Article *in* American Journal of Health Promotion · November 1996

DOI: 10.4278/0890-1171-11.2.87 · Source: PubMed

2 authors:

Gaston Godin
Université Laval
326 PUBLICATIONS **23,465** CITATIONS
SEE PROFILE

Gerjo Kok
Maastricht University
591 PUBLICATIONS **30,172** CITATIONS
SEE PROFILE

The Theory of Planned Behavior: A Review of Its Applications to Health-related Behaviors

Gaston Godin, Gerjo Kok

Abstract

Purpose. *To review applications of Ajzen's theory of planned behavior in the domain of health and to verify the efficiency of the theory to explain and predict health-related behaviors.*

Methods. *Most material has been drawn from* Current Contents *(Social and Behavioral Sciences and Clinical Medicine) from 1985 to date, together with all peer-reviewed articles cited in the publications thus identified.*

Findings. *The results indicated that the theory performs very well for the explanation of intention; an averaged* R^2 *of .41 was observed. Attitude toward the action and perceived behavioral control were most often the significant variables responsible for this explained variation in intention. The prediction of behavior yielded an averaged* R^2 *of .34. Intention remained the most important predictor, but in half of the studies reviewed perceived behavioral control significantly added to the prediction.*

Conclusions. *The efficiency of the model seems to be quite good for explaining intention, perceived behavioral control being as important as attitude across health-related behavior categories. The efficiency of the theory, however, varies between health-related behavior categories. (Am J Health Promot 1996;11[2]:87-98.)*

Key Words: Health, Behavior, Intention, Attitude, Perceived Control, Measurement.

INTRODUCTION

Over the past 20 years, social psychology theories have gained in popularity, as is indicated by the increased use of their applications to predict and understand social behaviors in different domains. Among these applications, Fishbein and Ajzen's theory of reasoned action has attracted the attention of several researchers,[1-3] and various aspects of the theory have been scrutinized extensively.[4-6]

Among several researchers who have noted different limitations of the theory of reasoned action, Ajzen[7-9] observed that the theory was particularly valuable when describing behaviors that were mainly under volitional control. The performance of the theory appeared to be poor with behaviors over which people have incomplete volitional control. In such situations, variables not included in the model have been reported as contributing to the prediction of intention and behavior over and above its main theoretical constructs. In this regard, Ajzen noted that most behaviors are located at some point along a continuum that extends from total control to complete lack of control. The person has total control when there are no practical constraints to the adoption of a given behavior. At the opposite extreme, if adoption of the behavior requires opportunities, resources, or skills that are currently lacking, the person has a complete lack of control. To take account of such limitations, whether real or perceived, Ajzen[7-9] added a third element to the original Fishbein and Ajzen model—the concept of perceived behavioral control. Thus the

Gaston Godin, PhD, Université Laval, Québec, Canada. Gerjo Kok, PhD, University of Limburg, Maastricht, The Netherlands.

Send reprint requests to Gaston Godin, PhD, École des sciences infirmières, Université Laval, Québec (Québec), Canada, G1K 7P4.

Submitted April 28, 1995; revisions requested October 5, 1995; accepted for publication January 2, 1996.

0890-1171/96/$5.00 + 0 67/1/72058

theory of planned behavior extends beyond the theory of reasoned action to include the concept of perceived behavioral control. The model is presented in Figure 1.

Perceived behavioral control can influence intention, as can the attitudinal and normative components. It can also influence behavior directly, in parallel with the potential influence of intention, in situations where behavior is not under the total control of the person.

Attitude towards the behavior (Aact) is an expression of one's positive or negative evaluation of performing a given behavior. The perceived subjective social norm (SN) reflects personal perception of the social expectations to adopt a given behavior. Perceived behavioral control (PBC) reflects personal beliefs as to how easy or difficult performing the behavior is likely to be.[9] It is assumed to reflect external factors (e.g., availability of time or money, social support) as well as internal factors (e.g., ability, skill, information).[10]

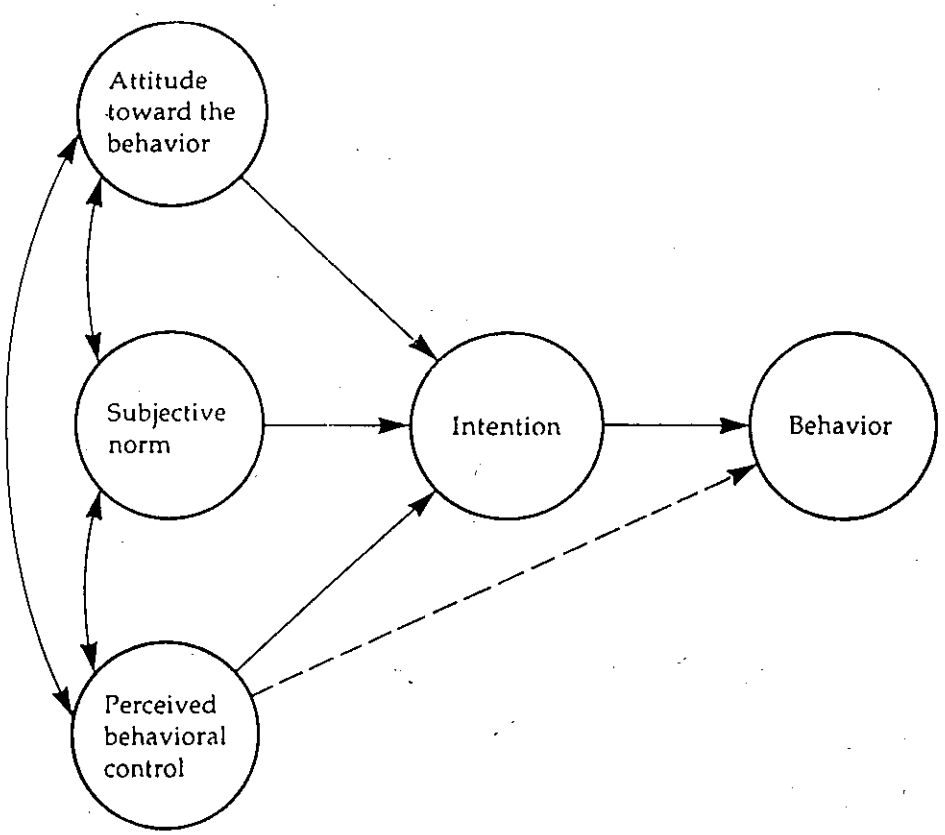
Other theorists also have acknowledged the importance of this concept in predicting behavior.[11,12] For instance, the operationalization of facilitating conditions in Triandis is identical to one of Ajzen's operationalizations of perceived behavioral control: both focus on beliefs about how easy or difficult performance of a behavior is likely to be. Self-efficacy is also viewed as a notion conceptually related to perceived behavioral control. Self-efficacy is defined as people's belief in their capabilities to achieve different levels of performance attainment.[13] People's beliefs in their efficiency affect the choices they make, how much effort they invest in their activities, how long they persevere in the face of difficulties, their vulnerability to stress and depression, and their resiliency after setbacks.[11] Finally, because of its resemblance with the self-efficacy concept, expectancy of success from Weiner's attribution model can also be viewed as a measure of perceived behavioral control.[14] It is viewed as "the estimate people make about the likelihood that a certain outcome or goal will be attained."[15]

Although developed relatively recently, the theory has already been applied in a number of studies. The aim of this article is to review these applications of the theory of planned behavior in the domain of health. In particular, the following aspects are scrutinized:

- The strength of association between each of the theoretical constructs with intention and behavior (overall and for each behavioral category)
- The explained variation in intention and behavior (overall and for each behavioral category)
- The importance of perceived behavioral control to explain a significant portion of variance in intention and behavior (overall and for each behavioral category)
- The contribution of other theoretical constructs to explain intention and predict behavior
- The influence of how perceived behavioral control was assessed on the relationships between the variables.

Figure 1

Schematic Representation of Ajzen's Theory of Planned Behavior



METHOD

The first step in preparing this review was to delimit studies for inclusion. Given the focus on health, studies applying the theory of planned behavior in other domains have been excluded. All reports considered were those that provided the basic information on the following variables: intention, attitude toward the action, subjective (social) norm and perceived behavioral control. Cross-sectional studies, however, that reported prediction of current behavior instead of intention were not included in this analysis because such prediction of current behavior does not respect the causal associations underlying the theory. The information scrutinized was: correlation coefficients; standardized regression coefficients; multiple R^2; change in R^2 attributed to perceived behavioral control; and any other statistical strategies providing a test of the theory (LISREL or discriminant analysis).

Table 1

Prediction of Intention from Attitude, Subjective Norm, and Perceived Behavioral Control

Study	Behavior	Correlations			Regression Coefficients				
		Attitude	Subjective Norm	Perceived Behavioral Control	Attitude	Subjective Norm	Perceived Behavioral Control	R^2 added by PBC	R^2
Addictive behavior (cigarette, alcohol, drugs, eating disorders)									
Boissonneault, Godin[17]	Smoking at work site areas	—	—	—	(n.s.)	(n.s.)	PBC:.19* S-E: .26**	yes	.76[a]
Borland,et al.[18]	Smoking	.59	.38	.37	—	—	—	—	—
De Vries[19] (cited in Kok et al.[16])	Smoking	.66	.47	.66	—	—	—	—	.62
De Vries, Backbier[20]	Quitting smoking	.45	.37	.32	( )**	( )**	( )**	.06**	.28
De Vries et al.[21]	Smoking	.66	.47	.66	.66***	.22*	.43***	.15**	.63
De Vries et al.[22]	Smoking								
	a. at baseline	.57	.40	.64	—	—	—	—	—
	b. at 6 months	.57	.43	.70	—	—	—	—	—
	c. at 12 months	.61	.51	.69	—	—	—	—	—
Godin, Lepage[23]	Smoking	.75	.11	.84	.31**	(n.s.)	.30***	yes	.80[a]
Godin et al.[24]	Smoking								
	a. general population	—	—	—	.22**	.17*	.55***	.29***	.39
	b. pregnant women	—	—	—	.31**	.07	.53***	.22***	.54
Morojele, Stephenson[25]	Abstaining from alcohol, drugs								
	a. admission	.28	.34	.13	.20	.27*	.04	no	.15
	b. discharge	.10	.05	.04	.13	.08	.03	no	.02
Schifter, Ajzen[26]	Reducing weight	.62	.44	.36	.79**	.17**	.30**	yes	.55
Schlegel et al.[27]									
	Getting drunk—problem drinker:								
	a. never	—	—	—	.36***	.23*	.25**	.04**	.43
	b. in the past	—	—	—	.35***	.20*	.28**	.07**	.39
	c. at present time	—	—	—	.46***	.04	.14	no	.26
Automobile-related behavior (driving,use of seat belts and child restraint device)									
Parker et al.[28]	Speeding	.36	.55	.59	.13***	.30***	.39***	.14***	.47
	Drunk driving	.29	.44	.58	.08**	.26***	.48***	.21***	.42
	Close following	.09	.45	.22	.06*	.40***	.18***	.03***	.23
	Risky overtaking	.28	.47	.38	.15***	.33***	.27***	.08***	.32
Parker et al.[29]	Cutting in	—	—	—	.16***	.11*	.16***	.06***	.35
	Reckless weaving	—	—	—	.12***	.07*	.19***	.08***	.37
	Overtaking on inside	—	—	—	.06*	.20***	.07*	.07*	.34
Richard et al.[30]	Child restraint device	—	—	—	[.35][†#]	[.13][†#]	[.50][†#]	yes	.67
Clinical and screening behavior									
Baumann et al.[31]	Getting a routine mammogram	—	—	—	[n.s.][†]	[.55][†#]	[.16][†#]	yes	—
Conner, Norman[32]	Having a health check	.68	.57	.41	.45**	.05	.03	no	.52[a]
De Vellis et al.[33]	Participating in cancer screening—people at:								
	a. high risk	.36	.18	.35	( )	( )	( )**	.08**	.21
	b. average risk	.42	.36	.43	( )	( )	( )***	.29***	.51
Godin et al.[34]	Performing clinical exam on HIV patients	—	—	—	.10***	.52***	.14***	yes	.50[a]
Godin et al.[35]	Seeking medical care promptly	.53	.22	.35	.44***	.09*	.16***	.02***	.31[a]
Hounsa et al.[36]	Using oral rehydration therapy	.35	.16	.26	.35***	.15	.28***	.08***	.22
McCaul et al.[37]	Breast self-exam	.58	.38	.63	.31*	.04	.45*	.14*	.48
	Testicular self-exam	.65	.31	.89	.11	.02	.82*	.39*	.82
Montano, Taplin[38]	Getting a mammogram	.47	.43	.39	—	—	—	—	—
Eating behavior									
Beale, Manstead[39]	Limiting infants' sugar intake								
	a. at baseline	.32	.17	.27	.26**	.10	.22**	.05*	.16
	b. 1 to 4 weeks later	.43	.26	.38	.35**	.08	.27**	.06**	.27
Brug et al.[40]	Consuming								
	a. boiled vegetables	.17	.09	.34	.11*	.03	.31**	yes	.13
	b. salads	.30	.19	.35	.19**	.12	.27**	yes	.17
	c. fruit	.17	.06	.69	.00	.02	.69**	yes	.47

Study	Behavior	Correlations			Regression Coefficients				
		Attitude	Subjective Norm	Perceived Behavioral Control	Attitude	Subjective Norm	Perceived Behavioral Control	R^2 added by PBC	R^2
Madden et al.[41]	Avoiding caffeine	—	—	—	—	—	—	.04	.66
	Taking vitamin supplements	—	—	—	—	—	—	.01	.44
Sparks et al.[42]	Eating whole wheat bread	.50	.12	.14	.51***	.06	.02	no	.25
	Eating sweet biscuits	.46	.08	.12	.47***	.07	.15	yes	.24
Sparks, Shepherd[43]	Consuming organic vegetables	.38	.30	.27	.20**	.18*	.26	yes	.41[a]
Exercising behavior									
Ajzen, Driver[44]	Jogging	.59	.55	.74	.14*	.19*	.52**	.17***	.66
	Mountain climbing	.44	.60	.69	.05	.18*	.52**	.15***	.52
	Biking	.64	.45	.58	.42**	.13	.30**	.05***	.50
Biddle et al.[45]	Exercising								
	a. men	—	—	—	( )**	(n.s.)	(n.s.)	no	.46
	b. women	—	—	—	( )**	(n.s.)	(PBC)** (S-E)**	.09**	.62
Boudreau et al.[46]	Exercising	—	—	—	.22***	(n.s.)	.28***	yes	.43[a]
Collette et al.[47]	Exercising	—	—	—	.16***	.02	.07	no	.52[a]
Courneya[48]	Exercising	.51	.47	.48	.22*	.17*	.18*	yes	.38[a]
Dzewaltowski et al.[49]	Exercising	.43	.24	.40	.33***	.04	.30***	.09***	.27
Gatch, Kendzierski[50]	Exercising	—	—	—	.30*	.23*	.25*	.05**	.30
Godin, Gionet[51]	Exercising	.38	.04	.41	.39***	.05	.35***	.11***	.26
Godin et al.[52]	Exercising	.42	.13	.40	.32***	.03	.29***	yes	.24
Godin et al.[53]	Exercising								
	a. general population	[.46]	[.06]	[.63]	[n.s.]†	[n.s.]†	[.41]†#	yes	—
	b. pregnant woman	[.54]	[.31]	[.41]	[.38]†#	[n.s.]†	[.32]†#	yes	—
Godin et al.[54]	Exercising								
	a. nullipara	—	—	—	.43***	(n.s.)	.37***	.13**	.41
	b. pluripara	—	—	—	.27***	(n.s.)	.60***	.48***	.54
Horne[55]	Exercising								
	a. inactive	—	—	—	.23*	.08	.20*	yes	.13
	b. active	—	—	—	.32*	.22*	.18*	yes	.26
Kimiecik[56]	Exercising	.77	.17	.71	.53***	.01	.35***	.07***	.66
Madden et al.[41]	Exercising	—	—	—	—	—	—	.04	.50
Theodorakis[57]	Exercising	.39	.18	.56	.17***	.03	.48***	.19***	.34
Wankel et al.[58]	Exercising	.36	.25	.42	.28***	.18***	.39***	.16***	.31
Yordy, Lent[59]	Exercising	.76	.42	.12	( )**	( )*	(n.s.)	no	.59
HIV/AIDS-related behavior									
Basen-Engquist, Parcel[60]	Having or abstaining from sex	.58	.43	.30	.48**	.09**	.15**	.02**	.36
	Using condoms	.27	.28	.33	.17**	.13	.26**	.06**	.17
Boyd, Wandersman[61]	Using condoms	—	—	—	( )***	( )*	(n.s.)	no	.38[a]
Chan, Fishbein[62]	Using condoms	.48	.33	.27	.34**	.19**	.06	no	.29[a]
Lavoie, Godin[63]	Using condoms	.60	.59	.29	.42***	.37***	.24**	yes	.53
Nucifora, al.[64]	Using condoms	—	—	—	.39***	.37***	.14*	.03*	.47
Richard et al.[65]	Using contraceptives	.34	.71	.60	[0.05]†	[.43]†#	[.34]†#	yes	—
Schaalma et al.[66]	Using condoms	.58	.47	.48	.34***	.15***	.26***	.12***	.49
Terry [67]	Using condoms	—	—	—	.34**	.19*	.21**	.04**	.62
White et al.[68]	Using condoms	—	—	—	.49***	.30***	.22***	yes	.69[a]
	Discussing condom use	—	—	—	.18*	.26**	.16*	yes	.33[a]
Wilson et al.[69]	Using condoms								
	a. men	.61	.38	.09	.41**	.07	.16*	.03*	.26
	b. women	.48	.26	.17	.54**	.13	.12	no	.38
Oral hygiene behavior									
McCaul et al[37].	Brushing teeth	.26	.54	.66	( )	( )	( )*	.19**	.52
	Flossing teeth	.49	.41	.51	( )	( )	( )*	08**	.39
McCaul et al.[70]	Brushing teeth	.32	.16	.58	.14	.03	.53	.25*	.36
	Flossing teeth	.22	.37	.71	.01	.18	.70*	.45*	.60
Tedesco et al.[71]	Brushing teeth	.67	.51	.85	—	—	—	—	—
	Flossing teeth	.54	.55	.73	—	—	—	—	—

—, Information not given; *(n.s.)*, not significant; *S-E*, self-efficacy; [a], full model (including additional variables); *( )*, tested but information not presented; *[ ]†*, parameter estimates from LISREL; *[ ]*, polychoric correlations; *#*, reached significance level.

* $p < .05$
** $p < .01$
*** $p < .001$

Table 2

Prediction of Behavior from Intention and Perceived Behavioral Control

Study	Behavior	Correlations: Intention	Correlations: Perceived Behavioral Control	Regression Coefficients: Intention	Regression Coefficients: Perceived Behavioral Control	R^2 added by PBC	R^2
Addictive behavior (cigarette, alcohol, drugs, eating disorders)							
Borland et al.[18]	Smoking						
	Making attempt to quit	——	——	{.90}	{.16}	yes	——
	Outcome of attempt to quit	——	——	{.31}	{n.s.}	no	——
De Vries[19] (cited in Kok et al.[15])	Smoking	.64	.50	——	——	——	.42
De Vries et al.[22]	Smoking						
	a. at baseline	.66	——	( )*	(n.s.)	no	.44
	b. at 6 months	.56	——	( )*	(n.s.)	no	.56
	c. at 12 months	.71	.61	( )*	( )*	yes	.51
Godin et al.[34]	Smoking						
	a. general population	——	——	.16	.42***	.12***	.27
	b. pregnant women	——	——	.19	.80***	.34***	.46
Schifter, Ajzen[26]	Reducing weight	.25	.41	.20	.39**	.13**	.19
Automobile-related behavior (driving, use of seat belts and child restraint device)							
Richard et al.[65]	Child restraint device	——	——	——	[.50]†#	yes	.26
Clinical and screening behavior							
Conner, Norman[32]	Attendance at health check	.15	.14	.10	.09	no	.04
De Vellis et al.[33]	Participating in cancer screening—people at:						
	a. high risk	.33	.34	.42**	.32**	.08**	.20
	b. average risk	.50	.19	.54***	.10	no	.27
McCaul et al.[70]	-Breast self-exam	.30	.27	( )*	(n.s.)	no	.09
	-Testicular self-exam	.34	.41	( )*	( )*	.06*	.18
Montano, Taplin[38]	Getting a mammogram	.50	.37	——	——	——	——
Eating behavior							
Madden et al.[41]	Avoiding caffeine	——	——	——	——	.02	.49
	Taking vitamin supplements	——	——	——	——	.01	.59
Exercising behavior							
Ajzen, Driver[44]	Jogging	.72	.62	.58**	.17	no	.53
	Mountain climbing	.65	.61	.43**	.31**	.06**	.48
	Biking	.48	.32	.45**	.06	no	.23
Dzewaltowski et al.[49]	Exercising	.32	.10	.32***	.02	no	.10
Godin et al.[35]	Exercising						
	a. general population	[.59]	[.39]	[.36]†#	[.10]†	no	——
	b. pregnant women	[.28]	[.11]	[.03]†	[.02]†	no	——
Kimiecik[56]	Exercising	.68	.60	.52***	.23***	.03***	.49
Madden et al.[41]	Exercising	——	——	——	——	.13	.44
Theodorakis[57]	Exercising	.47	.54	.25***	.38***	.10***	.32
Valois et al.[72]	Exercising	——	——	.31***	(n.s.)	no	.32
Yordy, Lent[59]	Exercising	——	——	{ }***	{ }***	yes	.36[a]
HIV/AIDS–related behavior							
Boyd, Wandersman[61]	Using condoms	.52	——	( )*	(n.s.)	no	.27
Nucifora et al.[64]	Using condoms	——	——	.60***	.18**	.06***	.62
Terry[67]	Using condoms	——	——	.45**	.12	no	.38
White et al.[68]	Using condoms	——	——	.79***	.04	.01	.64[a]
	Discussing condom use	——	——	.20	.54*	.18*	.22[a]
Oral hygiene behavior							
McCaul et al.[37]	Brushing teeth	.52	.39	( )*	(n.s.)	.01	.28
	Flossing teeth	.61	.38	( )*	(n.s.)	.01	.38
McCaul et al.[70]	Brushing teeth	.33	.39	( )	( )	.06*	.17
	Flossing teeth	.33	.31	( )	( )	.02*	.11
Tedesco et al.[73]	Brushing teeth	.32	.57	( )	( )	.24***	.34
	Flossing teeth	.45	.48	( )	( )	.07	.26

—, Information not given; *{ }*, discriminant function; *(n.s.)*, not significant; *S-E*, self-efficacy; [a], full model (including additional variables); *( )*, tested but information not presented; *[ ]†*, parameter estimates from LISREL; *[ ]*, polychoric correlations; *#*, reached significance level.

* $p < .05$

** $p < .01$

*** $p < .001$

Regarding perceived behavioral control, studies were included as long as such control was assessed in one of the following manners:

- According to Ajzen[8,9] or Ajzen and Madden[16] specifications (i.e., perceived behavioral control or sum of perceived barriers)
- According to Triandis (i.e., facilitating conditions or perceived constraints)
- According to Bandura (i.e., self-efficacy)

Most material has been drawn from *Current Contents* (Social and Behavioral Sciences and Clinical Medicine) from 1985 to date, together with all peer-reviewed articles cited in the publications thus identified. Lastly, a few researchers known to apply this or similar social cognitive theories were contacted and asked for accepted manuscripts or manuscripts in print.

The total number of applications extracted from these articles is greater than the number of published articles found; a few articles present information on more than one behavior or applications of one behavior in more than one sample. The numbers of applications used in the various analyses presented vary because not all articles provide information on each statistic examined.

RESULTS

Fifty-six studies (but 58 behavioral applications) were retained. All of these studies provided information to verify, totally or partially, the efficiency of the theory of planned behavior to explain intention or predict behavior. These 58 applications were classified in the following behavioral categories (Table 1)[17-71]:

- Addictive (cigarette, alcohol, drugs, eating disorders) (n = 11)
- Automobile (n = 3)
- Clinical and screening (cancer screening, health check, etc.) (n = 8)
- Eating (n = 5)
- Exercising (n = 18)
- HIV/AIDS (n = 10)
- Oral hygiene (n = 3)

Twenty-six of these 58 behavioral applications (46.4% of the studies) provided data on the prediction of the behavior (Table 2).[72,73]

Fifty-six publications reported a total of 87 applications regarding intention. Among these 87 applications, 57 reported the correlation coefficients. The overall average correlations between intention and attitude, subjective norm and perceived behavioral control were .46, .34, and .46 respectively (Table 3). The values for Aact were above the mean for addictive, clinical and screening, exercising, and HIV/AIDS-related behaviors. For subjective norm, the highest values were found for automobile-related and oral hygiene behaviors; subjective norm was low for eating and exercising behaviors. The perceived behavioral control values were high for oral hygiene behaviors and low for HIV/AIDS-related and eating behaviors.

The R^2 value was available in 76 of the 87 applications (Table 4). Overall, the average explained variance in intention was 40.9%, varying from 32.0% (eating behaviors) to 46.8% (oral hygiene behaviors). Perceived behavioral control was found significant in 65 (85.5%) of 76 analyses reported in the publications, whereas attitude and subjective norm were found significant, respectively, in 62 (81.6%) and 36 (47.4%) of these applications. For the studies that reported a significant additional contribution of perceived behavioral control, above attitude and subjective norm, the average added R^2 was 13.1%; this value varied from 5.0% (eating behavior) to 24.3% (oral hygiene behaviors).

Twenty-six studies provided information on 40 applications predicting future behavior. Among these 40 applications, only 26 presented information on correlation coefficients. The overall average correlations between behavior and intention and perceived behavioral control were .46 and .39, respectively (Table 3). The highest value for intention and perceived behavioral control was found for addictive behaviors, whereas the lowest value was found for clinical and screening behaviors.

The R^2 value was available for 35 of the 40 applications (Table 4). Overall, the average explained variance in behavior was 34.0%, varying from 15.6% (clinical and screening behaviors) to 42.3% (HIV/AIDS-related behaviors). Among 41 applications providing information on the added contribution of perceived behavioral control, above intention, there was an almost perfect split between the applications where perceived behavioral control reached (n = 21) or did not reach (n = 20) the significance level. When significant, the additional contribution of perceived behavioral control, above intention, averaged 11.5%. For each of the health behavior catego-

Table 3

Averaged Correlations Between Ajzen's Theoretical Constructs and Intention and Behavior for Different Health-related Behavior Categories

	Averaged Correlation Between Intention and...			Averaged Correlation Between Behavior and...	
Health Behavior Categories	Attitude	Subjective Norm	Perceived Behavioral Control	Intentions	Perceived Behavioral Control
Addictive	.53 (11)	.32 (11)	.49 (11)	.56 (5)	.51 (3)
Clinical, Screening	.51 (8)	.33 (8)	.46 (8)	.35 (6)	.29 (6)
Driving	.26 (4)	.48 (4)	.44 (4)	(n.a.)	(n.a.)
Eating	.34 (8)	.16 (8)	.32 (8)	(n.a.)	(n.a.)
Exercising	.51 (13)	.30 (13)	.50 (13)	.52 (8)	.41 (8)
HIV/AIDS	.49 (8)	.43 (8)	.32 (8)	.52 (1)	(n.a.)
Oral Hygiene	.42 (6)	.42 (6)	.67 (6)	.37 (6)	.42 (6)
Overall	.46 (58)	.34 (58)	.46 (58)	.46 (26)	.39 (23)

( ), Numbers of applications; *(n.a.)*, not available.

ries, this value was near the mean (between 7.0% and 12.0%), with the exception of addictive behaviors at 19.7%. Intention was also found to each the significance level in 24 of these 40 applications (60.0%).

DISCUSSION

In the present study, the averaged R^2 for intention and behavior were .41 and .34, respectively. Although the analysis is qualitative rather than quantitative, it is interesting to note that these values compare favorably with those reported in meta-analytic studies of the theory of reasoned action (that does not include perceived behavioral control). Sheppard et al.[5] found average R^2 values of .436 for intention and .281 for behavior. Randall and Wolff[4] reported an averaged R^2 of .202 for behavior. Van den Putte[6] reported average R^2 values of .462 and .384 for intention and behavior, respectively. Nevertheless, the present study differs from the previously cited studies because it focused exclusively on health-related behaviors, a domain that was not well covered in the reviews of Sheppard et al. and Randall and Wolff; published articles from the health education and promotion field were not included in these meta-analyses.

In the domain of health, about a third of the variations in behavior can be explained by the combined effect of intention and perceived behavioral control. Intention, however, remains the most important variable; 66.2% of the explained variance is attributed to intention (22.5% of the 34.0% explained variance). Thus in general, health-related behaviors remain largely within one's personal motivation. The exception would be behavioral categories where perceived behavioral control plays a more important role than intention. In spite of limitations in making such inferences, given the low number of published articles reporting data on behavior prediction (longitudinal studies), addictive (19.7% of the 40.7% explained variance: 48.4%) and clinical and screening (7.0% of the 15.6% explained variance: 44.9%) behaviors are categories where perceived behavioral control carries more weight than intention. This observation is congruent with the theory of planned behavior because these latter two categories of behavior are likely to be affected not only by personal motivation but also by other factors (e.g., addiction, easy access to health services, availability of resources).

There is no doubt that perceived behavioral control is an important variable for explaining intention. According to the present observations, it is as important as attitude toward the action. Fishbein has argued that the latest definition of perceived behavioral control proposed by Ajzen "essentially equates perceived behavioral control with an affective measure of attitude."[74] In light of the present results, however, perceived behavioral control seems to stand by itself. The perceived behavioral control-attitude correlation averaged from the information available in 24 of the reviewed studies was .32; the median value was .27. This indicates that the shared variance between the two constructs is only 10%. Nonetheless, considering the variety of methods that were used to assess perceived behavioral control (e.g., strength of self-efficacy, sum of perceived barriers, other methods using only one or more scales), appropriate guidelines for its assessment are strongly needed.

The theory seems to perform quite well across behavioral categories with respect to explaining intention. For the prediction of behavior, however, its efficiency varies. For instance, the R^2 was quite low for clinical and screening behaviors, whereas much higher values were observed for addictive and HIV/AIDS–related

Table 4

Averaged R^2 Obtained and Additional Contribution Made by Perceived Behavioral Control in the Prediction of Intention and Behavior

	Intention				Behavior			
		Added R^2 by Perceived Behavioral Control				Added R^2 by Perceived Behavioral Control		
		Yes (N=65)		No		Yes (N=21)		No
Health Behavior Categories	Averaged R^2 (N=76)	a* (N=43)	b† (N=22)	(N=14)	Averaged R^2 (N=35)	a* (N=14)	b† (N=7)	(N=20)
Addictive	.448 (13)	.138 (6)	2	3	.407 (7)	.197 (3)	2	3
Clinical, Screening	.446 (8)	.167 (6)	3	1	.156 (5)	.070 (2)	0	3
Driving	.396 (8)	.096 (7)	0	0	.260 (1)	(n.a.)	1	(n.a.)
Eating	.320 (10)	.055 (2)	5	3	.250 (2)	(n.a.)	2	2
Exercising	.424 (21)	.174 (12)	7	4	.363 (9)	.080 (4)	1	6
HIV/AIDS	.414 (12)	.050 (6)	4	3	.423 (5)	.120 (2)	1	3
Oral Hygiene	.468 (4)	.243 (4)	0	0	.257 (6)	.107 (3)	0	3
Overall	.409 (76)	.131 (43)			.340 (35)	.115 (14)		

( ), Number of applications; *(n.a.)*, not available.
* Studies providing the added R^2 value by perceived behavioral control.
† Studies reporting perceived behavioral control as significant without providing the added R^2 value.

behavioral categories. In their review of applications of the Fishbein and Ajzen theory, Randall and Wolff[4] found that type of behavior was clearly linked to the strength of the intention-behavior relationship. They speculate that the inability to enact one's intention in some areas may result from various personal and environmental control factors. In support of this interpretation, it can be argued that clinical and screening behaviors imply performance of a succession of steps before they could be realized. For instance, getting a mammogram involves the following actions: to make an appointment with a physician, to go to this appointment, to obtain a prescription for the mammography, and to go to this appointment. Consequently, the prediction of the behavior located at one end of this continuum (getting a mammogram) might be too distant to secure a good prediction. This, also, suggests that for this category of health-related behaviors perceived and actual behavioral control differ. As indicated by Ajzen, "Under those conditions, a measure of perceived behavioral control may add little to accuracy of behavioral prediction."[9] This, however, remains to be confirmed by additional longitudinal studies; the low number of such studies reviewed in the present article does not provide a sufficient set of data supporting a definite conclusion.

Warshaw and Davis[75] have argued that the concepts of intention and expectation have been used interchangeably in applications of social cognitive models. Intention is defined as the expressed motivation to perform some behavior or achieve some goal, whereas expectation represents the estimates of whether one will actually perform the behavior. The effect of how intention is measured on the performance of the model is not well known. A recent meta-analysis, however, that included 98 studies[4] showed that the intention-behavior correlation was not influenced by how intention was measured. Also, Van den Putte[6] found no significant differences between intention and behavioral expectation for their correlation with behavior. The observations derived from the present review corroborate these conclusions; the averaged intention-behavior was .49 when a measure of intention was reported (15 studies) and .44 when expectation (8 studies) had been assessed. Similarly, the perceived behavioral control-intention correlation did not appear to be affected by how intention is measured (intention [24 studies]: $r = .44$; expectation [21 studies]: $r = .43$). Thus as noted earlier in this text, it can be hypothesized that in the domain of health the intention-behavior and perceived behavioral control-intention correlations vary according to the type of behavior under study, not according to how intention is measured. Further studies, however, are needed on this issue because the number of applications is not yet sufficient for a proper test of this hypothesis.

In general, social influence on intention appears to be less important than attitude or perceived behavioral control. Not only did it reach significance level less often, but in situations where it does contribute to prediction its weight is lower than the other two constructs. This observation is not new; it has been previously noted in reviews of applications of this theory in specific behavioral domains.[76,77] A few authors[78,79] have suggested that the consistent low contribution of the social norm variable is related to the operationalization of this construct. Other methods should be examined, such as the method proposed by Grube et al.[79] in their study of smoking intentions and behavior they have successfully incorporated the assessment of perceived behavioral norms as part of the perceived social norms construct. Similarly, De Vries, Backbier, Kok, and Dijkstra[22] observed, in a group of high school students, that modeling has a strong social influence on smoking intentions and behavior. The social influences may exert their effect via different routes, and they suggested measuring not only social norms but also perceived behaviors of others and pressure encountered from significant persons.

Several of the studies reviewed have reported that variables not included in the theory of planned behavior contributed to explain significant portions of variance in intention and, in a few cases, in behavior. In this regard, the following two variables seem to be important: personal norm, assessed as self-identity or role identity, and moral norm or personal normative beliefs. Personal norm, which is self-identity or role identity, refers to one's perception of how a person like me should behave. It is also viewed as role beliefs one holds because of one's position in the social structure; these role beliefs could prevail because of one's age, gender, relationship and social status. Moral norms or personal normative beliefs are feelings of personal responsibility regarding the performance or not of a given action. Self-identity was identified as an important variable for the consumption of organically produced vegetables,[43] whereas role identity was shown to play a significant role in exercising behavior.[57] Moral norm or personal normative belief was found to be important for condom use,[61] smoking of cigarettes,[17] exercising,[47] and driving behaviors.[29] The possible contribution of such external variables has been acknowledged by Ajzen: "The theory of planned behavior is, in principle, open to the inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behavior after the theory's current variables have been taken into account."[9] Therefore we propose that these two theoretical constructs be given full consideration in further studies of health-related behaviors. In doing so, however, the theory of planned behavior becomes progressively similar to Triandis' formulation of intention in his theory of interpersonal behavior.[12] In the Triandis theory, role beliefs (i.e., role identity), a subdimension of the social construct, and perceived normative belief (moral norm) are two of the variables defining one's intention, along the affective and cognitive dimensions of attitudes. A similar conclusion has been drawn by Manstead and Parker[80] after their research program on driving behavior.

To the best of our knowledge, this is the first review of health-related

applications of Ajzen's theory of planned behavior. In spite of the limited number of available articles, it was possible to estimate its performance to explain intention and predict behavior. In particular, the efficiency of the model seems to be quite good for explaining intention, perceived behavioral control being as important as attitude across health-related behavior categories. The efficiency of the theory, however, varies between health-related behavior categories. For given categories of health-related behaviors, the discrepancy between perceived and actual control might be the cause for this low efficiency of the model. Full understanding of this hypothesis, however, has yet to be confirmed. It was observed that numerous methods were used to assess the constructs of the theory, sometimes generating confusion in the interpretation of the findings. Thus it is urgent to provide appropriate procedures to guide the development of research instruments, especially in the domain of health where a number of researchers varying in professional background are increasingly attracted to applying social cognitive theories. Finally, role beliefs and feelings of personal responsibility should be added to the theory of planned behavior for studying health-related behaviors.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

This review indicates that Ajzen's theory of planned behavior performs well across behavioral categories with respect to explaining intention. For the prediction of behavior, however, its efficiency varies. Moreover, in addition to Ajzen's theoretical variables, it is proposed that role beliefs and moral norms be added to the model in further studies of health-related behaviors. On the basis of these findings researchers should be concerned about the importance of careful measurement, especially regarding the procedures applied to assess the theoretical variables of the model.

Acknowledgments

Supported by the Fonds pour la formation de Chercheurs et l'Aide à la Recherche (ER-0699). We wish to thank Antony S. R. Manstead and the Editor for their helpful comments on an earlier version of the manuscript.

References

1. Fishbein M, Ajzen I. Belief, attitude, intention and behavior. Don Mills, New York: Addison-Wesley, 1975.
2. Ajzen I, Fishbein M. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall, 1980.
3. Eagly A, Chaiken S. The psychology of attitudes. Orlando, FL: Harcourt Brace Jovanovich College, 1993.
4. Randall D, Wolff J. The time interval in the intention-behaviour relationship: meta-analysis. Br J Soc Psychol 1994;33:405-18.
5. Sheppard B, Hartwick J, Warshaw P. The theory of reasoned action: a meta-analysis of past research with recommendations for modifications and future research. Journal of Consumer Research 1988;15;325-43.
6. Van den Putte B. On the theory of reasoned action [unpublished dissertation]. Amsterdam, The Netherlands: University of Amsterdam, 1993.
7. Ajzen I. From intention to actions: a theory of planned behavior. In: Kuhl J, Beckmann J, editors. Action-control: from cognition to behavior, Heidelberg: Springer, 1985:11-39
8. Ajzen I. Attitudes, personality, and behavior. Chicago: Dorsey Press, 1988.
9. Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes 1991;50:179-211.
10. Ajzen I, Timko C. Correspondence between health attitudes and behavior. Journal of Basic and Applied Social Psychology 1986;7:259-76.
11. Bandura A. Self-efficacy mechanism in human agency. Am Psychol 1982;37:122-47.
12. Triandis H. Values, attitudes, and interpersonal behavior. In: Howe H, Page M, editors. Nebraska Symposium on Motivation 1979. Lincoln, NE: University of Nebraska Press, 1980:195-259.
13. Bandura A. Self-efficacy: toward a unifying theory of behavior change. Psychol Rev 1977;84:191-215.
14. Weiner B. An attributional theory of achievement motivation and emotion. Psychol Rev 1985;92:548-73.
15. Kok G, Den Boer D, De Vries H. Gerards F, Hospers H, Mudde A. Self-efficacy and attribution theory in health education. In: Schwarzer R, editor. Self-efficacy: thought control of action. Washington, DC: Hemisphere Publishing, 1992:245-62.
16. Ajzen I, Madden T. Prediction of goal-directed behavior: attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology 1986;22:453-74.
17. Boissonneault E, Godin G. The prediction of intention to smoke only in designated work site areas. J Occup Med 1990;32:621-4.
18. Borland R, Owen N, Hill D, Schofield P. Predicting attempts and sustained cessation of smoking after the introduction of workplace smoking bans. Health Psychol 1991;10:336-42.
19. De Vries H. Smoking prevention in Dutch adolescents [unpublished dissertation]. Maastricht, The Netherlands: University of Limburg, 1989.
20. De Vries H, Backbier E. Self-efficacy as an important determinant of quitting among pregnant women who smoke: the ϕ-pattern. Prev Med 1994;23:167-74.
21. De Vries H, Dijkstra M, Kuhlman P. Self-efficacy: the third factor besides attitude and subjective norm as predictor of behavioral intentions. Health Education Research 1988;3:273-82.
22. De Vries H, Backbier E, Kok G, Dijkstra M. The impact of social influences in the context of attitude, self-efficacy, intention and previous behavior as predictors of smoking onset. Journal of Applied Social Psychology 1995;25:237-57.
23. Godin G, Lepage L. Understanding the intentions of pregnant nullipara to not smoke cigarettes after childbirth. J Drug Educ 1988;18:115-24.
24. Godin G, Valois P, Lepage L, Desharnais R. Predictors of smoking behaviour: an application of Ajzen's theory of planned behaviour. British Journal of Addiction 1992;87:1335-43.
25. Morojele N, Stephenson M. Addictive behaviours: predictors of abstinence intentions and expectations in the theory of planned behaviour. In: Rutter D, Quine L, editors. Social psychology and health: European perspectives. Brookfield, VT: Avebury, 1994:47-70.
26. Schifter D, Ajzen I. Intention, perceived control, and weight loss: an application of the theory of planned behavior. J Pers Soc Psychol 1985;49:843-51.
27. Schgel R, D'Avernas J, Zanna M, DeCourville N, Manske S. Problem drinking: a problem for the theory of reasoned action? Journal of Applied Social Psychology 1992;22:358-85.
28. Parker D, Manstead A, Stradling S, Reason J, Baxter J. Intention to commit driving violations: an application of the theory of planned behavior. J Appl Psychol 1992;77:94-101.
29. Parker D, Manstead A, Stradling S. Extending the theory of planned behaviour: the role of personal norm. Br J Soc Psychol 1995;34:127-37.
30. Richard L, Dedobbeleer N, Champagne F, Potvin L. Predicting child restraint device use: a comparison of two models. Journal of Applied Social Psychology 1994;24:1837-47.
31. Baumann L, Brown R, Fontana S, Cameron L. Testing a model of mammography intention. Journal of Applied Social Psychology 1993;23: 1733-56.
32. Conner M, Norman P. Comparing the health belief model and the theory of planned behaviour in health screening. In: Rutter D, Quine L, editors. Social psychology and health: European perspectives. Brookfield, VT: Avebury, 1994:1-24.
33. De Vellis B, Blalock S, Sandler R. Predicting participation in cancer screening: the role of perceived behavioral control. Journal of Applied Social Psychology 1990;20:639-60.
34. Godin G, Boyer R, Duval B, Fortin C, Nadeau D. Understanding physicians' decision to perform a clinical examination on an HIV seropositive patient. Med Care 1992;30: 199-207.
35. Godin G, Fortin C, Mahnès G, et al. University students' intention to seek medical care promptly if symptoms of sexually transmitted diseases were suspected. Sex Transm Dis 1993;20:100-4.
36. Hounsa A, Godin G, Alihonou E, Valois P, Girard J. An application of Ajzen's theory of planned behaviour to predict mothers' intention to use oral rehydration therapy in a rural area of Benin. Soc Sci Med 1993;37:253-61.
37. McCaul K, O'Neill K, Glasgow R. Predicting the performance of dental hygiene behaviors: an examination of the Fishbein and Ajzen model and self-efficacy expectations. Journal of Applied Social Psychology 1988;18:114-28.
38. Montano D, Taplin S. A test of an expanded theory of reasoned action to predict mammography participation. Soc Sci Med 1991;32:733-41.
39. Beale D, Manstead A. Predicting mothers' intentions to limit frequency of infants' sugar intake: testing the theory of planned behavior.

Journal of Applied Social Psychology 1991;21: 409-31.
40. Brug J, Lechner L, De Vries H. Psychosocial determinants of fruit and vegetable consumption. Appetite. In press.
41. Madden T, Ellen P, Ajzen I. A comparison of the theory of planned behavior and the theory of reasoned action. Personality and Social Psychology Bulletin 1992;18:3-9.
42. Sparks P, Hedderly D, Shepherd R. An investigation into the relationship between perceived control, attitude variability and the consumption of two common foods. European Journal of Social Psychology 1992;22:55-71.
43. Sparks P, Shepherd R. Self-efficacy and the theory of planned behavior: assessing the role of identification with "green consumerism." Social Psychology Quarterly 1992;55:388-99.
44. Ajzen I, Driver B. Application of the theory of planned behavior to leisure choice. Journal of Leisure Research 1992;24:207-24.
45. Biddle S, Goudas M, Page A. Social-psychology predictors of self-reported actual and intended physical activity in a university workforce sample. Br J Sports Med 1994;28:160-3.
46. Boudreau F, Godin G, Pineau R, Bradet R. Health risk appraisal in an occupational setting and its impact on exercise behavior. Journal of Occupational and Environmental Medicine 1995;37:1145-50.
47. Collette M, Godin G, Bradet R, Gionet NJ. "Active living in communities: understanding the intention to take up physical activity as an everyday way of life." Can J Public Health 1994;85:418-21.
48. Courneya K. Understanding readiness for regular physical activity in older individuals: an application of the theory of planned behavior. Health Psychol 1995;14:80-7.
49. Dzewaltowski D, Noble J, Shaw J. Physical activity participation: social cognitive theory versus the theories of reasoned action and planned behavior. Journal of Sport and Exercise Psychology 1990;12:388-405.
50. Gatch C, Kendzierski D. Predicting exercise intentions: the theory of planned behavior. Research Quarterly for Exercise and Sport 1990;61:100-2.
51. Godin G, Gionet N. Determinants of an intention to exercise of an electric power commission's employees. Ergonomics 1991;34:1221-30.
52. Godin G, Valois P, Jobin J, Ross A. Prediction of intention to exercise of individuals who have suffered from coronary heart disease. J Clin Psychol 1991;47:763-72.
53. Godin P, Valois P, Lepage L. The pattern of influence of perceived behavioral control upon exercising behavior: an application of Ajzen's theory of planned behavior. J Behav Med 1993;16:81-102.
54. Godin, G Vézina, L Leclerc, O. Factors influencing intentions of pregnant women to exercise after giving birth. Public Health Rep 1989;104:188-95.
55. Horne T. Predictors of physical activity intentions and behavior for rural homemakers. Can J Public Health 1994;85:132-5.
56. Kimiecik J. Predicting vigorous physical activity of corporate employees: comparing the theories of reasoned action and planned behavior. Journal of Sport and Exercise Psychology 1992;14:192-206
57. Theodorakis Y. Planned behavior, attitude strength, role identity, and the prediction of exercise behavior. Sport Psychologist 1994;8:149-65.
58. Wankel L, Mummery K, Stephens T, Craig C. Prediction of physical activity intention from social psychological variables: results from the Campbell's survey of well-being. Journal of Sport and Exercise Psychology 1994;16:56-69.
59. Yordy G, Lent R. Predicting aerobic exercise participation: social cognitive, reasoned action, and planned behavior models. Journal of Sport and Exercise Psychology 1993;15:363-74.
60. Basen-Engquist K, Parcel G. Attitudes, norms, and self-efficacy: a model of adolescents' HIV-related sexual risk behavior. Health Educ Q 1992;19:263-77.
61. Boyd B, Wandersman A. Predicting undergraduate condom use with the Fishbein and Ajzen and the Triandis attitude-behavior models: implications for public health interventions. Journal of Applied Social Psychology 1991;21:1810-30.
62. Chan D, Fishbein M. Determinants of college women's intentions to tell their partners to use condoms. Journal of Applied Social Psychology 1993;23:1455-70.
63. Lavoie M, Godin G. Correlates of intention to use condoms among auto mechanic students. Health Education Research 1991;6:313-6.
64. Nucifora J, Gallois C, Kashima Y. Influences on condom use among undergraduates: testing the theories of reasoned action and planned behaviour. In: Terry D, Gallois C, McCamish M, editors. The theory of reasoned action: its applications to AIDS-preventive behaviour. New York: Pergamon Press, 1993:47-64.
65. Richard R, Van des Pligt J, De Vries N. Anticipated affective reactions and prevention of AIDS. British Journal of Social Psychology 1995;34:9-22.
66. Schaalma H, Kok G, Peters L. Determinants of consistent condom use by adolescents: the impact of experience of sexual intercourse. Health Education Research 1993;8:255-69.
67. Terry D. Self-efficacy expectancies and the theory of reasoned action. In: Terry D, Gallois C, McCamish M, editors. The theory of reasoned action: its applications to AIDS-preventive behaviour New York: Pergamon Press, 1993:135-51.
68. White K, Terry D, Hogg M. Safer sex behavior: the role of attitudes, norms, and control factors. Journal of Applied Social Psychology 1994;24: 2164-92.
69. Wilson D, Zenda A, McMaster J, Lavelle S. Factors predicting Zimbabwean students' intentions to use condoms. Psychology and Health 1992;7:99-114.
70. McCaul K, Sandgren A, O'Neill K, Hinsz V. The value of the theory of planned behavior, perceived control, and self-efficacy expectations for predicting health-protective behaviors. Basic and Applied Social Psychology 1993;14:231-52.
71. Tedesco L, Keffer M, Fleck-Kandath C. Self-efficacy, reasoned action, and oral health behavior reports: a social cognitive approach to compliance. J Behav Med 1991;14:341-55.
72. Valois P, Desharnais R, Godin G. A comparison of the Fishbein and the Triandis attitudinal models for the prediction of exercise intention and behavior. J Behav Med 1988;11:459-72.
73. Tedesco E, Keffer M, Davis E, Christersson L. Self-efficacy and reasoned action: predicting oral health status and behaviour at one, three, and six month intervals. Psychology and Health 1993;8:105-21.
74. Fishbein M. Introduction by Martin Fishbein. In: Terry D, Gallois C, McCamish M, editors. The theory of reasoned action: its applications to AIDS-preventive behaviour. New York: Pergamon Press, 1993:xv-xxv.
75. Warshaw P, Davis F. Disentangling between intention and behavioral expectation. Journal of Experimental Social Psychology 1985;21:312-28.
76. Godin G, Shephard RJ. Use of attitude—behaviour models in exercise promotion. Sports Med 1990;10:103-21.
77. Godin G. The theories of reasoned action and planned behavior: overview of findings, emerging research problems and usefulness for exercise promotion. Journal of Applied Sport Psychology 1993;5:141-57.
78. Miniard P, Cohen J. An examination of the Fishbein-Ajzen behavioral-intention model's concepts and measures. Journal of Experimental Social Psychology 1981;17:309-39.
79. Grube J, Morgan M, McGree S. Attitudes and normative beliefs as predictors of smoking intentions and behaviors: a test of three models. British Journal of Social Psychology 1986;25:81-93.
80. Manstead A, Parker D. Evaluating and extending the theory of planned behavior. In: Stroebe W, Hewstone M, editors. European Review of Social Psychology 1995;6:69-95.
81. Valois P, Godin G, Bertrand R. The reliability of constructs derived from attitude-behavior theories: an application of generalizability theory in the health sector. Quality and Quantity 1992;26:291-305.
82. Valois P, Godin G. The importance of selecting appropriate adjective pairs for measuring attitude based on the semantic differential method. Quality and Quantity 1991;25:57-68.

APPENDIX

Many researchers have difficulty in selecting appropriate items to assess psychosocial constructs. Others believe that previously used questionnaires have face value and, consequently, could be used to study the same behavior in a different population. Unfortunately, this is not the case. A new study always brings the necessity to develop a new questionnaire. The steps for the development of these questionnaires combine qualitative and quantitative methods. The steps to be followed are:

Step 1. A proper definition of the behavior under study must be obtained. In this regard, Fishbein and Ajzen[1] have proposed to include four elements: action, target, time, and context. For example: "To use (action) a condom (target) during the next sexual intercourse (time) with a new partner who takes contraceptive pills (context)." This definition is usually guided by epidemiologic data suggesting that performance of a behavior in a given context is likely to have public health consequences.

Step 2. Related to this definition of the behavior, it is necessary to identify the following information: (1) the list

of the most frequently perceived advantages and disadvantages of performing the behavior; (2) the list of the most important people or groups of people who would approve or disapprove one's performance of this behavior; and (3) the list of the perceived barriers or facilitating factors that could hamper or facilitate adoption of the behavior studied. This information is not created by the researcher and his or her colleagues but must be obtained from people (about 25 individuals) with similar characteristics to those of the group of people to be studied (age categories, sex, socioeconomic level, educational level, ethnocultural background). Open-ended questionnaires, interviews, or focus groups, can be used to obtain this qualitative information.

Step 3. Content analysis of this information is realized by at least two researchers. They have to reach a final agreement on ordering and labeling of the themes (beliefs) extracted: (1) behavioral beliefs; (2) normative beliefs; and (3) control beliefs. As indicated by Ajzen and Fishbein,[2] the beliefs most often listed (accounting for 75% of all beliefs stated) are retained and included in the first draft of the questionnaire.

Step 4. The first draft of the questionnaire must be pilot tested for comprehension, level of language (specificity, sensitivity), and clarity with from 5 to 10 persons sharing the same characteristics as the group of people to be studied. Then, if necessary, modifications to wording of the questions are made.

Step 5. The second draft of the questionnaire is submitted to a test-retest reliability study (generally, 2 weeks apart). Thirty subjects sharing the same characteristics as the group of people to be studied are needed for this reliability study. Data are analyzed for temporal stability and internal consistency. The questionnaire is reviewed and, if needed, a few items are eliminated or reworded.

Step 6. The final version of the questionnaire is ready to be used in the main study.

The examples provided hereafter only illustrate how social cognitive constructs might be worded. Only the main (global) constructs are illustrated. For each of the belief-based constructs, researchers are invited to see Ajzen and Fishbein[2] and Ajzen.[9] Examples are provided for different behaviors to illustrate different facets of construct measurement. A number of points, nevertheless, must be highlighted:

1. Although few constructs, such as intention, are highly reliable,[81] it is preferable to assess the social cognitive constructs with more than one item. In fact, three items or more are recommended because this allows the use of a more stable averaged composite score.
2. Constructs are generally assessed on 7-point scales. The decision to use 5-point scales or 3-point scales depends on the characteristics of the studied population. For example, if the level of cognitive development is not yet fully completed (e.g., schoolchildren), the answers are likely to be recorded on 5-point or 3-point scales.
3. Special attention should be given to the selection of the adjectives to be placed at each end of a scale. For example, not all pairs of adjectives can be used to measure attitude toward different health-related behaviors.[82] To be used, a pair of adjectives must have relevance to the behavior studied and present a proper semantic stability. Thus use of "unpleasant/pleasant" is relevant to smoking cigarettes but not to breast self-examination. The good/bad scale for the measure of attitude toward breast self-examination lacks stability because individuals could attach a different meaning to this scale pair (health reasons vs religious beliefs). The appropriateness of the pairs of adjectives to be used could be verified during step 4 described above.

The present review article has highlighted the need for appropriate guidelines for the assessment of social cognitive variables. Ajzen and Fishbein[2] have provided clear examples regarding the assessment of attitude, subjective norm, and intention. Similarly, Ajzen[8] has indicated how perceived behavioral control should be assessed. There is, however, a lack of information regarding how to assess other important social cognitive variables. Below are presented examples illustrating how these additional theoretical constructs should be measured.

1. The social construct can be assessed as perception of behaviors of others:

a. My father smokes cigarettes.

Not at all	He quit smoking	Occasionally	Regularly, but not daily	Yes, daily

b. My mother smokes cigarettes.

Not at all	She quit smoking	Occasionally	Regularly, but not daily	Yes, daily

c. Most of my friends smoke cigarettes.

No	Probably not	Maybe/ maybe not	Probably	Yes

The answers are summed to form a perceived-behaviors-of-others scale. Note that in the example provided above, the list of items (a to c) must be obtained from a preliminary qualitative elicitation study (as explained in step 2 above).

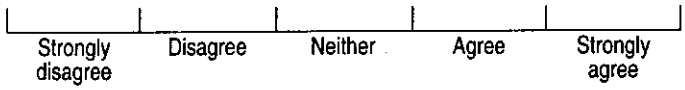
Perceived behavioral control can also take the form of a self-efficacy scale. For example, subjects (e.g., persons with coronary heart disease) might be asked, on likely/unlikely 7-point scales: "What is the probability that the following factors will stop you from exercising regularly?"

a. No access to a specialized exercise center
b. Difficulties in time management
c. Heart pain
d. Your age
e. Psychological difficulties in adapting to life again
f. No exercise partner
g. Fear of having another heart attack
h. Physician counter-indication
i. Laziness

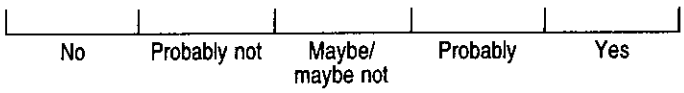
The answers are summed to form the self-efficacy (or perceived behavioral control) scale. Note that in the example provided above, the list of items (a to i) must be obtained from a preliminary qualitative elicitation study (as explained in step 2 above).

The perceived normative belief (PNB) or moral norm construct should be assessed by means of at least three scales. For example, the following three scales could be assessed and combined into one composite score (average of the sum of the three scales).

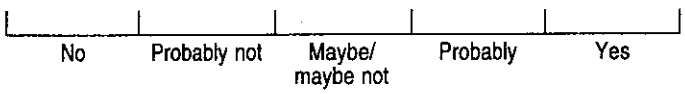
PNB1) I think it would be wrong not to make sure a condom is used each time I have sex with a new partner during the next 3 months.



PNB2) When having sexual intercourse with a new partner during the next 3 months, I would feel guilty if we didn't use a condom each time.

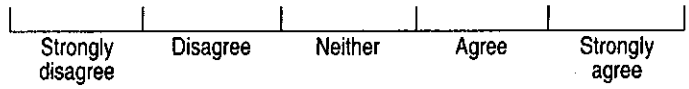


PNB3) When having sexual intercourse with a new partner during the next 3 months, I would believe in using a condom each time.

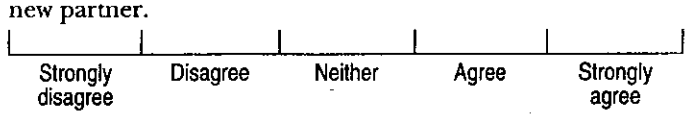


In a given population there might be several factors defining one's perceived roles regarding adoption of a given behavior. These factors are usually generated through qualitative interview or open-ended questionnaires. The role beliefs (RB) construct or role identity should also be assessed by means of a number of scales. For example, the following three scales could be assessed and combined into one composite score (average of the sum of the three scales).

RB1) Generally speaking, it is appropriate for a person of my age to make sure a condom is used each time she has sex with a new partner.



RB2) Generally speaking, it is appropriate for a woman to make sure a condom is used each time she has sex with a new partner.



RB3) Generally speaking, it is appropriate for a person of my relationship status (e.g., married, single...) to make sure a condom is used each time she has sex with a new partner.