Do Injunctive and Descriptive Normative Beliefs Need a Value-laden Multiplier in Value Expectancy Models? A Case Series across Multiple Health Behaviors

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Abstract

The purpose of this study was to evaluate the benefit of transforming expectancy-based determinants of injunctive and descriptive norms with a value-laden construct across a case series of health behaviors. This case series draws upon three cases (sugar-sweetened beverages, physical activity, and sleep), each evaluating generalized injunctive ($\sum$IN) and descriptive norms ($\sum$DN), with corresponding value-expectancy based determinants: injunctive normative belief strength (inb_i) and motivation to comply (mtc_i), and descriptive normative belief strength (dnb_i) and identification with referents (iwr_i). Each belief-based measure (inb_i/dnb_i) and product between belief-based measure and value-laden measure ($inb_i \times mtc_i/dnb_i \times iwr_i$) was correlated to its corresponding generalized scale ($\sum$IN/$\sum$DN), and the associations were compared using Steiger's test for comparing two dependent correlations with one variable in common. Across three case series, generalized injunctive norms ($\sum$IN) was correlated to 12 referents using a value-expectancy model ($inb_i \times mtc_i$) and expectancy-only model (inb_i), and generalized descriptive norms was correlated to 15 referents using the same approach ($inb_i \times iwr_i$ vs. dnb_i). Using Steiger's test, it was found that the expectancy-only model was significantly better than the value-expectancy model for injunctive norms, but results were mixed for descriptive norms. Results from this study suggest that value-laden constructs only add error when evaluating determinants of injunctive norms, and researchers should consider re-scaling or finding alternative means of measuring mtc_i. Results pertaining to descriptive norms were mixed, and a better consensus on best methods for operationalizing the construct is warranted.

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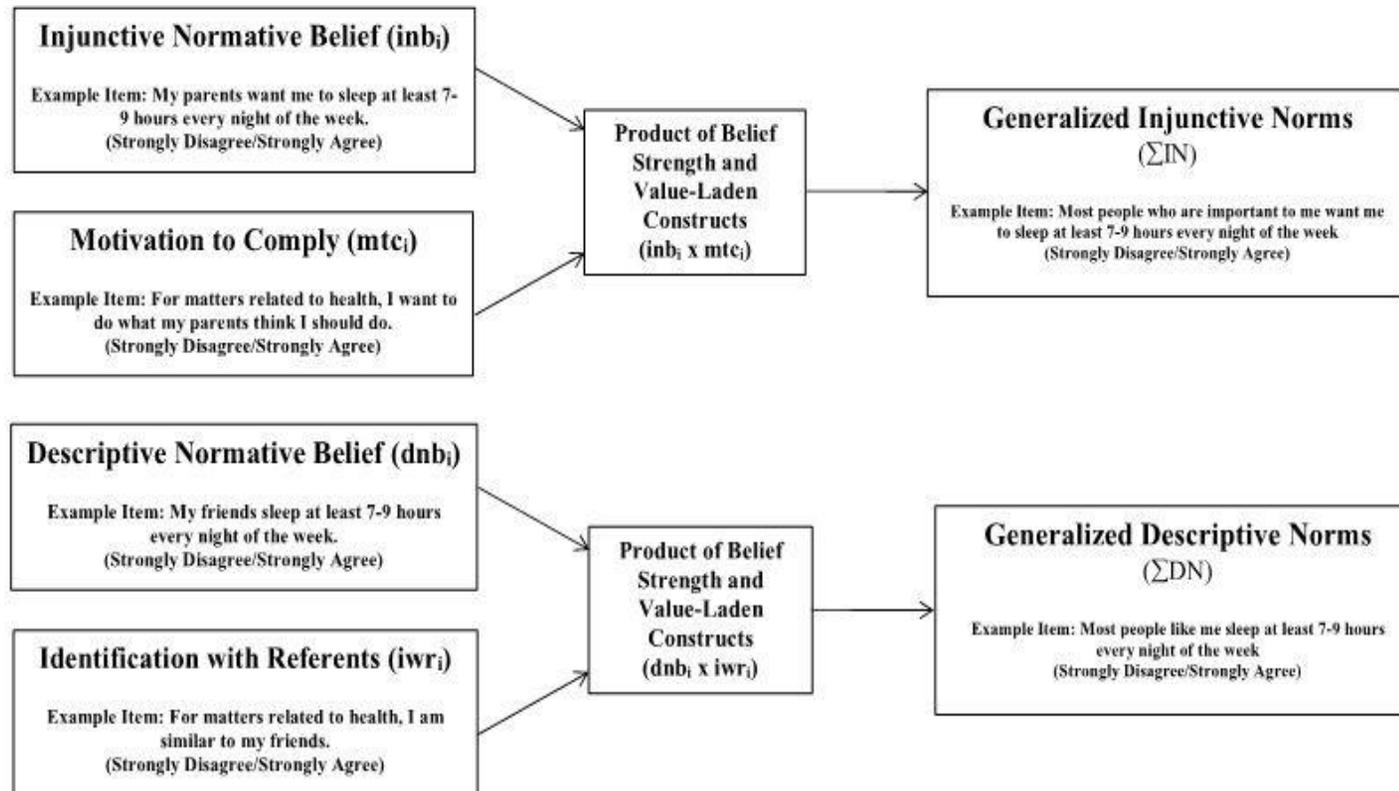
Value-expectancy models are commonplace in the social and behavioral sciences (ie, health, communication, education, communications, marketing, and economics), and posit that behaviors are determined by behavioral antecedents (eg, attitudes). Furthermore, behavioral antecedents are determined by an individual's belief that a behavior leads to certain outcomes (expectancy), and the value one places each outcome (value). A popular value-expectancy model in health behavior research is the Theory of Planned Behavior (TPB), which was recently updated to the Integrative Behavioral Model (IBM) or the Reasoned Action Approach (RAA).[1,2] According the TPB/IBM/RAA, behavioral intentions are the strongest antecedent towards performing a behavior or action, barring any environmental constraints or deficiency in skills/abilities. Intentions are further determined by one's attitudes towards a behavior, perceived norms about the behavior, and perceived behavioral control over a behavior. Perceived norms, or the social pressure one feels to engage in (or not engage in) a behavior, further consists of two types of normative pressure: injunctive norms, or the perception that significant individuals in

one's life want them to behave in a certain way, and descriptive norms, or the perception that a behavior is normal for people like themselves, and thus, should be performed. When measuring perceived norms as part of the TPB/IBM/RAA, it is recommended that both injunctive and descriptive norms are operationalized and summated into a single scale. Items on such scales are commonly referred to as *direct measures* of injunctive ($\sum$IN) and descriptive ($\sum$DN) norms. To properly operationalize injunctive and descriptive norms, items on each scale should follow the principle of compatibility by having each type of norm directed towards a TACT-specific behavior (target, action, context and time). For example, "Most people who are important to me want me to do behavior x" (Strongly Agree/Strongly Disagree) is a traditional *direct measure* of injunctive norms, whereas "Most people like me perform behavior x" (Strongly Agree/Strongly Disagree) is a traditional *direct measure* of descriptive norms.

A critical aspect of developing *direct measures* of injunctive and descriptive norms is that items are based on a generalized set of social referents. That is, items measuring injunctive norm generally refer to "the people most important to me," whereas items measuring descriptive norms generally refer to "most people like me." How individuals form these generalized injunctive and descriptive norms is important for understanding individual and social behaviors. To understand which social referents are associated with how individuals form generalized injunctive and descriptive norms, Fishbein and Ajzen[1] have suggested using the classic value-expectancy approach. Determinants of injunctive norms are evaluated by considering multiple injunctive normative beliefs (inb_i), or beliefs that important individuals or groups in one's life want them to perform a behavior, or act in a certain way. Since each referent may not have equal status in an individual's life, it is also recommended to consider how much value each referent has by measuring a "motivation to comply" (mtc_i) value for each referent. Determinants of descriptive norms are formed by considering multiple descriptive normative beliefs (dnb_i), or beliefs that a behavior is normative for peers and individuals we look up to in social groups. Again, since each referent may not have equal status in an individual's life, it is recommended to consider how much value each referent has by measuring an "identification with referent" (iwr_i) value for each referent. To understand how each referent is associated with generalized injunctive or descriptive norms, each referent belief strength (inb_i or dnb_i) is multiplied by a corresponding value-laden multiplier (mtc_i or iwr_i) and correlated (r) to the corresponding direct measure scale ($\sum$IN or $\sum$DN). This is illustrated in Figure 1.

Many studies have utilized the value-expectancy measurement model with injunctive norms; however, some evidence has shown that measuring motivation to comply with injunctive normative belief strength does little for improving the understanding of how the referent is a determinant of injunctive norms. This has been demonstrated in a limited number of studies, namely, when evaluating women's intentions to receive a mammogram[3], seat belt use among college students[4], and marijuana use among adolescents.[5] This evidence has led Fishbein and Ajzen[1] to note that despite the intuitive appeal of having a value-expectancy measurement model, motivation to comply appears to add little to no value towards predicting injunctive norms. Furthermore, they note that motivation to comply may even add error variance towards predicting injunctive norms, thus creating problems for researchers and practitioners.[1] Currently, evidence that shows the inadequacies of motivation to comply are anecdotal, and no formal tests have been performed to show that expectancy-only-based models (or belief-based models) perform better than value-expectancy models. Therefore, the first purpose of this study was to evaluate the effect of transforming expectancy-based determinants of injunctive norms with a value-laden construct

Figure 1. Value-Expectancy Models for Injunctive and Descriptive Norms

Injunctive Normative Belief (inb$_i$)

Example Item: My parents want me to sleep at least 7-9 hours every night of the week. (Strongly Disagree/Strongly Agree)

Motivation to Comply (mtc$_i$)

Example Item: For matters related to health, I want to do what my parents think I should do. (Strongly Disagree/Strongly Agree)

Product of Belief Strength and Value-Laden Constructs (inb$_i$ x mtc$_i$)

Generalized Injunctive Norms (ΣIN)

Example Item: Most people who are important to me want me to sleep at least 7-9 hours every night of the week (Strongly Disagree/Strongly Agree)

Descriptive Normative Belief (dnb$_i$)

Example Item: My friends sleep at least 7-9 hours every night of the week. (Strongly Disagree/Strongly Agree)

Identification with Referents (iwr$_i$)

Example Item: For matters related to health, I am similar to my friends. (Strongly Disagree/Strongly Agree)

Product of Belief Strength and Value-Laden Constructs (dnb$_i$ x iwr$_i$)

Generalized Descriptive Norms (ΣDN)

Example Item: Most people like me sleep at least 7-9 hours every night of the week (Strongly Disagree/Strongly Agree)

across a case series of studies using health behaviors, and compare the model to a non-transformed expectancy-based model. This was accomplished using Steiger's test for comparing two dependent correlations with one variable in common, thus comparing correlations produced by the value-expectancy model (inb_i x mtc_i) and expectancy-only-based model (inb_i) to the direct measures of injunctive norms ($\sum IN$).[6]

The construct *descriptive norms* was added to the TPB to account for a separate type of normative pressure not captured by injunctive norms. The addition of descriptive norms was also supported by a meta-analysis exploring the additive effects it had towards predicting intentions, which showed that after accounting for attitudes, injunctive norms, and perceived behavioral control, descriptive norms added 5% to the explained variance in intentions.[7] Compared to the total number of studies published on the TPB/IBM/RAA, only a small number have evaluated descriptive norms. It is difficult to know why this construct has not fully diffused among researchers, however Fishbein and Ajzen[1] have noted that best methods for measuring the construct have not reached consensus. Unlike injunctive norms, studies that document determinants of descriptive norms using the value-expectancy measurement model, via descriptive normative belief strength (dnb_i) and identification with referents (iwr_i), are virtually non-existent.[1] Furthermore, with regards to the value-laden construct *identification with referents,* Fishbein and Ajzen[1] noted that like motivation to comply, this value-laden construct may do little to improve the prediction of descriptive norms. In conjunction with the first purpose of this study, the second purpose of this study was to evaluate the effect of transforming expectancy-based determinants of descriptive norms with a value-laden construct across a case series of studies using health behaviors, and compare the model to a non-transformed expectancy-based model. Steiger's test for comparing two dependent correlations was used in the same way to answer this research question.[6]

Methods

Measurement models were evaluated using three separate data sets collected at different time periods for three health behaviors: sugar-sweetened beverage consumption, physical activity, and sleep. Each study followed a similar protocol, and are described in greater detail in the subsequent sections. Following the protocol established by Fishbein and Ajzen[1], belief-based measures for each study were developed from an elicitation study using individuals from their respective populations.

Case Study 1

The purpose of the first case study was to operationalize the TPB/IBM/RAA for overweight and obese adults ($n = 410$) attending a weight-loss clinic in a southwestern city, for the behavior "*To stop drinking regular soda and other sugary drinks for the next 6 months.*" Injunctive (3 items) and descriptive norms (2 items) were evaluated directly and indirectly, through belief-based measures [injunctive normative beliefs (inb_i): (1) spouse/significant other, (2) friends, (3) children, and (4) parents; descriptive normative beliefs (dnb_i): (1) spouse, (2) coworker, and (3) friends]. Each belief also had a corresponding value-laden measure (mtc_i or iwr_i). Adults were recruited in the clinic's reception area, where a member of the research team approached every potential participant, explained the purpose of the study, and asked participants to read over an informed consent form. Afterwards, participants who were willing to participate

were administered the survey face to face by a member of the research team, who was available to read the survey to the participant if they desired. On average, the survey took 15 minutes to complete. Participants were only allowed to participate if they currently consumed sugary beverages, since the behavior was phrased 'to stop consuming the beverage', and would not apply to individuals who already did not consume sugary beverages. Data collection occurred over a three-month period. The average age of adults in this sample was 35.2 years (+/-9.7), and there were more females ($n = 338$, 82%) than males ($n = 70$, 17%). This was also a racially diverse sample of adults (58% Caucasian, 15% African American, 13% Hispanic, 9% American Indian, and 4% other). A majority of the sample was obese (68.8%), compared to being overweight (31.2%), with an average body mass index of 34.23 (+/-7.0). Approval was obtained for this study from the sponsoring university's IRB office (#6281).

Case Study 2

The purpose of the second case study was to operationalize the TPB/IBM/RAA for college students ($n = 310$) attending a large, southwestern university, for the behavior "*Getting 7-9 hours of sleep each night for the next 6 months.*" Injunctive (2 items) and descriptive norms (2 items) were evaluated directly and indirectly, through belief-based measures [injunctive normative beliefs (inb_i): (1) parents, (2) friends, (3) extended family members, and (4) professors; descriptive normative beliefs (dnb_i): (1) traditional college students, (2) parents, (3) children (K-6th grade), (4) working adults, and (5) friends]. Each belief also had a corresponding value-based measure (mtc_i or iwr_i). Students were recruited via an online mass email distributed to the study body at the sponsoring university's main campus. The total number of students reached through this process included those that were enrolled at least part time, and those who did not opt out of the mass email distribution list (N = 18,647). The response rate for this study was 1.7%. Participants were first asked to report "During the past month, how many hours of actual sleep did you get per night? (This may be different than the number of hours you spend in bed)," an item used from the Pittsburg Sleep Hygiene Index.[8] Only students who answered less than 7 hours per night were invited to take the survey. The average amount of sleep per night students reported was 5.5 hours (+/-0.7). The average age of the students in this sample was 19.9 years (+/-1.6), and there were more female (n=212, 68.4%) than male students (n=87, 28.1%). This was also a racially diverse sample of students (68% Caucasian, 3% African American, 7% Hispanic, 7% Asian, and 19% other). Approval was obtained for this study from the sponsoring university's IRB office (#7441).

Case Study 3

The purpose of the third case study was to operationalize the TPB/IBM/RAA for college students ($n = 392$) attending a large, southwestern university, for the behavior "*Getting the recommended amount of moderate or vigorous cardio exercise every week.*" This behavior was defined by the 2008 Physical Activity Guidelines for Americans[9] of at least meeting one of the following criteria: 150 minutes of moderate activity each week; 75 minutes of vigorous activity each week; or a combination of moderate and vigorous activity that equals the first two recommendations. Injunctive (2 items) and descriptive norms (2 items) were evaluated directly and indirectly through belief-based measures [injunctive normative beliefs (inb_i): (1) parents, (2) friends, (3) significant others, and (4) coaches/personal trainers; descriptive normative beliefs

(dnb$_i$): (1) athletes, (2) people who are physically fit, (3) people who are generally healthy, (4) young adults, (5) elderly people, (6) overweight/obese people, and (7) people who are busy]. Each belief also had a corresponding value-based measure (mtc$_i$ and iwr$_i$). Students were recruited via an online mass email distributed to the study body at the sponsoring university's main campus and medical campus. The total number of students reached through this process included those that were enrolled at least part time, and those who did not opt out of the mass email distribution list (N = 22,086). The response rate for this study was 1.8%. The average age of the students in this sample was 19.9 years (+/-1.8), and there were more females (n = 272, 69.4%) than males (n = 120, 30.6%). The racial profile of this sample was as follows: (83% Caucasian, 2% African American, 2% Hispanic, 3% Asian, and 10% other). Approval was obtained for this study from the sponsoring university's IRB office (#7383).

Data Analysis

For each case study, direct measures of injunctive ($\sum$IN) and descriptive ($\sum$DN) norms were evaluated on a 7-point semantic differential scale. Items on each scale were first summated and then divided by the number of items in the scale, giving a range from -3 to +3 [ie, indicating a strong negative normative pressure (-3), to a strong positive normative pressure (+3)]. Items measuring normative beliefs were scaled from 1 to 7, and corresponding value-based measures were scaled from -3 to +3. Following standard protocol, corresponding expectancy-based and value-based measures were multiplied to create a composite value-expectancy measure (inb$_i$ x mtc$_i$; dnb$_i$ x iwr$_i$). Each value-expectancy based pair (ie, model 1: inb$_i$ x mtc$_i$) and expectancy-only measure (ie, model 2: inb$_i$) was then correlated to the direct measures of the corresponding construct. As demonstrated by the varying sample sizes on Tables 1 and 2 (where results are detailed), not all participants responded to each referent/value pair. This was done intentionally, as participants were instructed to answer N/A for items not applicable to them. For example, some participants in Case Study #1 did not have a spouse or children, so they were instructed not to answer those questions. Steiger's test for comparing two dependent correlations with one variable in common was utilized to evaluate whether significant differences emerged between model 1 and model 2.[8] Steiger's test evaluates the equality of two correlation coefficients (Pearson's r) obtained from the same sample, when the correlations have a variable in common.[10]

Results

Case Study 1

For the behavior "*To stop drinking regular soda and other sugary drinks for the next 6 months*" the mean score for injunctive norms and descriptive norms was .66 (+/-1.87), and .47 (+/-1.50) respectively, indicating that adults had mostly a neutral sense of social pressure to act on the behavior. In model 1, all value-expectancy pairs were significant ($p < .001$) for injunctive norms [spouse (r = .40); friends (r = .37); children (r = .43); parents (r = .39)], and ($p < .05$) descriptive norms [spouse (r = .17); coworkers (r = .11); friends (r = .17)]. In model 2, the associations were slightly improved for injunctive norms, but were mixed for descriptive norms. All of the correlations were significant ($p < .001$) for the injunctive norms [spouse (r = .50), friends (r = .48), children (r = .50), and parents (r = .53)], and for descriptive norms, only spouse

($r = .21$; $p < .001$) was significantly related. Using Steiger's test for injunctive norms, correlations using the expectancy-only model (model 2) were significantly higher ($p < .05$) than the value-expectancy model (model 1) for all referents, except children. For descriptive norms, no significant difference emerged between model 1 and model 2 (all p-values >.05).

Case Study 2

For the behavior "*Start sleeping 7-9 hours every night in the next 30 days*" the mean scores for injunctive and descriptive norms were 1.31 (+/-1.30) and -1.53 (+/-1.27), respectively. This indicated that students had a moderate to strong sense of social pressure to perform the behavior from individuals important to them, while at the same time feeling the behavior was not normative for people like them (ie, young adults perusing higher education). In model 1, all value-expectancy pairs were significant ($p < .001$) for injunctive norms [parents ($r = .22$); friends ($r = .21$); extended family members ($r = .28$); professors ($r = .35$)], and only two of the value-expectancy pairs were significant for descriptive norms [parents ($r = .16$; $p < .01$); children (K-6th grade ($r = .35$; $p < .001$))]. In model 2, the associations were slightly improved for all injunctive norms except professors, but again, results were mixed for descriptive norms. For injunctive norms, all correlations were significant ($p < .001$) [parents ($r = .29$); friends ($r = .32$); extended family members ($r = .28$); professors ($r = .22$)]. For descriptive norms, neither of the two referents from model 1 (parents or children) were significantly related (p-values < .05), whereas the remaining three referents were significantly related [traditional college students ($r = .42$); working adults ($r = .18$); friends ($r = .34$); all p-values < .01]. Mixed results were found when using Steiger's test for comparing models 1 and 2 for injunctive norms. Correlations using the expectancy-only model (model 2) were significantly higher ($p < .05$) than the value-expectancy model (model 1) for one referent (friends), the value-expectancy model (model 1) was significantly higher than the expectancy-only model (model 2) for one referent (professors), and there was no difference for the remaining two referents. Similar results were found for descriptive norms. The expectancy-only model (model 2) was significantly higher ($p < .05$) than the value-expectancy model (model 1) for two of the referents, the value-expectancy model (model 1) was significantly higher than the expectancy-only model (model 2) for one referent (children), and there was no difference for the remaining two.

Case Study 3

For the behavior "*Getting the recommended amount of moderate or vigorous cardio exercise every week*" the mean scores for injunctive and descriptive norms were 1.58 (+/-1.12), and -.06 (+/-1.42), respectively. This indicated that students experienced a moderate to strong sense of social pressure to perform the behavior from individuals important to them, but at the same time felt that the behavior was neither normal nor abnormal for people like them (ie, young adults perusing higher education). In model 1, all value-expectancy pairs were significant ($p < .001$) for injunctive norms [parents ($r = .43$); friends ($r = .34$); significant others ($r = .44$); coach/personal trainer ($r = .45$)], and five of the value-expectancy pairs were significant ($p < .05$) for descriptive norms [athletes ($r = .42$); fit people ($r = .41$); healthy people ($r = .33$); elderly people ($r = -.12$); overweight/obese people ($r = -.18$; $p < .001$)]. In model 2 using the expectancy-only model, all of the associations were slightly improved for injunctive norms, but again were mixed for descriptive norms. For injunctive norms, all correlations were significant

($p < .001$) [parents ($r = .52$); friends ($r = .49$); significant others ($r = .49$); coach/personal trainer (r = .59)], and for descriptive norms, all of the referents were significantly associated ($p < .01$) [athletes ($r = .14$); fit people ($r = .27$); healthy people ($r = .33$); young adults ($r = .25$); elderly people ($r = .23$); busy people ($r = .19$)], except for overweight/obese people. Using Steiger's test for injunctive norms, correlations using the expectancy-only model (model 2) were significantly higher ($p < .05$) than the value-expectancy model (model 1) for all referents, except significant other. Mixed results were found when comparing models 1 and 2 for descriptive norms. Correlations using the expectancy-only model (model 2) were significantly higher ($p < .05$) than the value-expectancy model (model 1) for two of the referents, the value-expectancy model (model 1) was significantly higher than the expectancy-only model (model 2) for two of the referents, and there was no difference for the remaining three referents.

Discussion

When deciding to engage in health behaviors, individuals often rely on social norms. This has been demonstrated across many areas of public health such as diet,[11,12] alcohol use,[13,14] and risky sexual behaviors.[15,16] Understanding significant determinants of social norms, specifically injunctive and descriptive norms, will help researchers and practitioners design effective health behavior change interventions and health communication strategies that rely on changing social norms. The purpose of this study was to evaluate the difference between value-expectancy and expectancy-only-based determinants of injunctive and descriptive norms across a case series of health behaviors. Results show that for injunctive norms, the expectancy-only-based determinants were significantly better correlated for a majority of cases (8 of the 12 referents). This is consistent with previous studies that have anecdotally observed the same differences.[1,4-6] However, this study also adds to the current literature by statistically showing that the expectancy-based model outperformed the value-expectancy based model in most cases using Steiger's test for comparing two dependent correlations with one variable in common. This supports Fishbein and Ajzen's notion that measuring *motivation to comply* likely adds error in measuring referent normative pressure, and in determining what referents are important for forming generalized injunctive normative pressure.[1]

With regard to evaluating the determinants of descriptive norms, results were mixed overall. The expectancy-only-based model was significantly better than the value-expectancy-based model in some instances (4 of the 15 referents), the value-expectancy-based model was significantly better than the expectancy-only-based model in other instances (3 of the 15), and in most instances (8 of the 15), the two measurement models did not differ statistically. The construct "*Descriptive Norms*" represented one of the major changes to the TPB, and the construct has not been fully diffused in research and practice regarding the TPB/IBM/RAA. One possible reason little research exists with descriptive norms as part of the TPB/IBM/RAA is the lack of consensus towards properly operationalizing and measuring the construct.[1] Current guidance for operationalizing descriptive norms within the TPB/IBM/RAA is to ask respondents questions such as "Most people like me perform behavior x" (Strongly Agree/Strongly Disagree), or "How many people similar to you perform behavior x?" (Virtually None/Almost All).[1] However, other approaches have also been used to evaluate descriptive norms. Fischer and colleagues[17] suggested that descriptive norms be measured using four aspects, including: (1) how people perceive themselves; (2) how people relate to others; (3) how people follow their goals; and (4) how cultures differentiate individual behaviors. Other instruments evaluate descriptive

norms based on perceptions of what others are doing. For example, the Drinking Norms Rating Form asks participants to report their perceptions of alcohol use among their peers, in terms of frequency (how often they drink) and intensity (how much do they drink per occasion).[18] Building a consensus on how to best operationalize and measure descriptive norms will likely lead to its inclusion in future studies. After this is accomplished, more research can then be produced to understand determinants of descriptive norms, using a value-expectancy approach.

Table 1

Value-Expectancy and Expectancy-only Determinants of Injunctive Norms

Case Study 1

	Injunctive Normative Belief Strength inb_i *(range 1 to 7)*		Motivation to Comply mtc_i *(range -3 to +3)*		Composite $inb_i \times mtc_i$ *(range -21 to +21)*		Correlation with TIN $inb_i \times mtc_i$ / inb_i *(Pearson's r)*		Steiger's Test *(p-value)*
Referent (sample size n)	*M*	*SD*	*M*	*SD*	*M*	*SD*			
Spouse/significant other (310)	4.75	2.10	0.59	2.15	4.55	10.97	0.40***	0.50***	< 0.05*
Friends (400)	4.14	1.95	-0.09	1.99	1.36	9.43	0.37***	0.48***	< 0.05*
Children (351)	4.21	1.97	0.55	2.03	4.00	9.60	0.43***	0.50***	0.06
Parents (371)	4.46	2.03	0.15	1.99	2.60	10.08	0.39***	0.53***	< 0.001***

Case Study 2

	inb_i *(range 1 to 7)*		mtc_i *(range -3 to +3)*		Composite $inb_i \times mtc_i$ *(range -21 to +21)*		Correlation with TIN $inb_i \times mtc_i$ / inb_i *(Pearson's r)*		Steiger's Test *(p-value)*
Referent (sample size n)	*M*	*SD*	*M*	*SD*	*M*	*SD*			
Parents (273)	6.19	1.16	1.33	1.52	8.64	9.92	0.22***	0.29***	0.14
Friends (276)	4.61	1.59	0.39	1.64	2.96	7.79	0.21***	0.32***	< 0.05*
Extended Family Members (203)	5.22	1.49	0.10	1.75	1.70	9.22	0.28***	0.31***	0.34
Professors (227)	4.99	2.58	0.30	1.72	2.79	8.72	0.35***	0.22***	< 0.05*

Case Study 3

	inb_i *(range 1 to 7)*		mtc_i *(range -3 to +3)*		Composite $inb_i \times mtc_i$ *(range -21 to +21*		Correlation with TIN $inb_i \times mtc_i$ / inb_i *(Pearson's r)*		Steiger's Test *(p-value)*
Referent (sample size n)	*M*	*SD*	*M*	*SD*	M	*SD*			
Parents (370)	5.36	1.50	0.55	1.84	4.32	10.07	0.43***	0.52***	< 0.05*
Friends (365)	4.66	1.54	0.01	1.75	1.42	8.66	0.34***	0.49***	< 0.01**
Significant Other (197)	5.18	1.62	0.90	1.93	6.56	9.85	0.44***	0.49***	0.21
Coach/Personal Trainer (99)	5.84	1.63	1.19	1.90	9.41	9.61	0.45***	0.59***	≤ 0.05*

Note. TIN means total injunctive norms.
Note. Significant * at $p < .05$, ** at $p < .01$, *** at $p < .001$.

Table 2

Value-Expectancy and Expectancy-only Determinants of Descriptive Norms

Case Study 1

Referent (sample size n)	Descriptive Normative Belief Strength dnb_i (range 1 to 7)		Identification with Referents iwr_i (range -3 to +3)		Composite dnb_i x iwr_i (range -21 to +21)		Correlation with TDN dnb_i x iwr_i / dnb_i (Pearson's r)		Steiger's Test (p-value)
	M	SD	M	SD	M	SD			
Spouse (303)	5.09	2.22	-0.21	2.28	-2.70	12.30	0.17**	0.21***	0.33
Coworkers (279)	6.06	1.50	-1.07	1.82	-7.09	11.50	0.11*	0.03	0.20
Friends (302)	6.00	1.44	-0.61	1.97	-4.20	12.31	0.17**	0.09	0.18

Case Study 2

Referent (sample size n)	dnb_i (range 1 to 7)		iwr_i (range -3 to +3)		Composite dnb_i x iwr_i (range -21 to +21)		Correlation with TDN dnb_i x iwr_i / dnb_i (Pearson's r)		Steiger's Test (p-value)
	M	SD	M	SD	M	SD			
Traditional College Students (307)	1.99	2.22	1.38	2.28	2.45	3.87	-0.04	0.42***	< 0.001***
Parents (303)	4.93	1.50	-0.33	1.82	-2.34	8.48	0.16**	0.11	0.28
Children (K-6th Grade) (297)	6.07	1.50	-1.56	1.82	-9.88	8.82	0.35***	-0.03	< 0.001***
Working Adults (303)	4.07	1.44	0.32	1.97	0.74	6.62	0.07	0.18**	0.10
Friends (303)	2.80	1.44	1.24	1.97	2.75	4.74	0.08	0.34***	< 0.001***

Case Study 3

Referent (sample size n)	dnb_i (range 1 to 7)		iwr_i (range -3 to +3)		Composite dnb_i x iwr_i (range -21 to +21		Correlation with TDN dnb_i x iwr_i / dnb_i (Pearson's r)		Steiger's Test (p-value)
	M	SD	M	SD	M	SD			
Athletes (392)	6.67	0.67	-0.55	1.95	-3.57	13.07	0.42***	0.14**	< 0.001***
Fit People (392)	6.20	0.95	0.37	1.92	2.46	12.14	0.41***	0.27***	< 0.01**
Healthy People (392)	5.52	1.12	0.87	1.64	4.95	9.54	0.33***	0.33***	0.50
Young Adults (392)	3.32	1.23	0.56	1.60	2.27	6.03	0.07	0.25***	< 0.001***
Elderly People (392)	2.52	1.13	-2.12	1.24	-5.00	3.88	-0.12*	0.23***	0.08
Overweight/Obese People (392)	1.86	1.09	-2.04	1.45	-3.37	3.58	-0.18***	0.09	0.13
Busy People (392)	2.84	1.20	0.27	1.74	1.24	5.31	-0.04	0.19***	< 0.05*

Note. TIN means total injunctive norms.
Note. Significant * at $p < .05$, ** at $p < .01$, *** at $p < .001$.

The impact social norms have on decision making and behavior change is sometimes demonstrated in laboratory studies, whereby researchers manipulate participants' perceptions of other people's behaviors. For example, in one study with undergraduate women, students were told what kind of snack bar other participants in the study selected (either healthy or unhealthy), and when given the choice, students tended to select the snack they believed other students had chosen.[11] In another study, adolescents were given brief messages about injunctive or descriptive norms pertaining to fruit consumption, and results shows that, while the descriptive norm group significantly increased fruit consumption in the following days (compared to a control condition), the injunctive norm group decreased fruit consuming in the following days (compared to a control group).[12] This line of research shows the importance of understanding which normative referents a target population will identify with. Larger population studies have also used social norms as a strategy to mediate behavior change. For example, *The Good Life Study* used three communication channels (face-to-face, print, and web-based communication) to provide normative messages about alcohol and drug use to public schools over a period of 8 weeks in Denmark.[19] However, not all interventions based on changing social norms have been able to change behaviors. In a national evaluation of a social norm intervention of almost 100 colleges targeting alcohol consumption, researchers found that students attending colleges that adopted the social norms marketing were not different in 7 measures of alcohol consumption (eg, daily and 30-day use, heavy episodic drinking, drunkenness), compared to students in schools that did not adopt the social norms marketing. This shows how critical it is to understand what factors are important for creating social norm messages.

There are a few notable limitations to this study that should be addressed. First, all case studies were based on self-reported data, and therefore have the potential for social desirability and other biases inherent in self-reported data. Second, the data presented here were based on the TPB/IBM/RAA as operationalized in health behaviors only, and therefore results on the usefulness of the value-laden constructs (mtc_i and iwr_i) should not be generalized to all behaviors. Third, two of the case studies used data from a college population, therefore the results cannot be generalized to the general population. Fourth, all three case studies used convenience samples, therefore the generalizability of our results may be limited. Finally, all of the case studies used a cross-sectional design, therefore nothing can be concluded about the causality between the generalized injunctive and descriptive norm constructs and their determinants. A specific limitation for Case Study #1 was that researchers did not track the number of participants who declined to participate. Although, anecdotally very few participants who were eligible declined participation (~10-20 participants).

Implications for Health Behavior Research

It has been well established that normative pressures can aid or hinder attempts at behavior change. Therefore, understanding determinants of normative pressure, including both injunctive and descriptive norms, is critical for guiding research and practice. It is not our intention to imply that the value-expectancy approach toward understanding determinants of injunctive and descriptive norms should be abandoned. Intuitively, the model is elegant for describing basic decision making, in that it accounts for both strength of belief and value given to each belief. Results from this study do suggest, however, that the current approach toward measuring the value-laden construct of injunctive norms (motivation to comply) is inadequate, and should likely be abandoned. To replace the current approach toward measuring motivation to

comply, we recommend that either existing scales be re-scaled and tested, or alternative approaches be considered. Typically, *motivation to comply* is on measured using semantic differential scales from 1 (Strongly Disagree) to 7 (Strongly Agree). Since items on the scale are based on referents from elicitation studies, this scaling technique may lead to low variation, and thus may not be effective. This has also been addressed by others, for evaluating the attitudes construct within the TPB/IBM/RAA.[1] To illustrate, consider the statement evaluating attitudes, "Eating healthy foods for breakfast is…": one would expect low variability if the response options were from *bad* (1) to *good* (7), because it is reasonable to believe that almost all individuals would rate this as being a *good* (7) behavior. Rather than using this methods for scaling, using scales such as *slightly good* (1) to *extremely good* (7) or (1) not at all important to (7) extremely important may promote variability. This may also be an effective strategy for scaling the *motivation to comply* construct [ie, "For matters related to health, I want to do what my parents thinks I should do": *slightly agree* (1) to *extremely agree* (7)].

Another strategy for measuring motivation to comply is based on the level of specificity upon which the construct is measured. That is, motivation to comply for a referent can be phrased from the most general sense (ie, "In general, I want to do what my parents think I should do"), to domain specific (ie, "For matters related to health, I want to do what my parents think I should do"), and to behavior specific (ie, "When it comes to me deciding to sleep 7-9 hours every night of the week, I want to do what my parents think I should do"). Fishbein and Ajzen[1] currently suggest measuring motivation to comply at the general level if possible, at the domain level if warranted, and never at the behavior-specific level. For example, doctors have expertise in helping people make health-related decisions, and therefore researchers may ask questions related to the health domain for this group of referents. However, no research has evaluated the effect level of specificity has on motivation to comply. This may be another interesting area for future studies.

In conclusion, while this study brings to light measurement issues related to evaluating injunctive and descriptive norms and their determinants, researchers and practitioners should always remember to develop instruments with the target population in mind. No matter how well researchers believe they have operationalized a theory, if the target population cannot understand the instrument, then the data-collection process becomes meaningless. During the instrument development process, members of the target population should be consulted to help with item development and, ultimately, should be asked to pilot test the instrument. This iterative process will help researchers tie theory in with practice, so that credible evidence can be created.

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