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## How do Social Norms Affect Physical Activity and Performance on an Endurance Task?

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HOW DO SOCIAL NORMS AFFECT PHYSICAL ACTIVITY AND  
PERFORMANCE ON AN ENDURANCE TASK?

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The School of Kinesiology

by

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## ABSTRACT

Despite the extensive benefits associated with a physically active life style, less than 50% of US adults engage in recommended levels of physical activity (PA), so finding ways to structure environments to promote PA is an important concern. Social norms, conceptualized as an individual's perception of peer behavior, provide a framework for exploring factors that influence decisions to be physically active. Although researchers have investigated how social norms influence a variety of behaviors, the PA domain has not been fully explored. The focus of this dissertation is to apply social norms theories to investigate how normative information influences PA intentions and exercise behaviors.

In the first study, using the Theory of Normative Social Behavior as a framework, interrelationships among social norms, exercise identity, group identity, outcome expectations, and PA intentions were explored in a correlational design. The focus was to explore the underlying mechanisms in the relationship between descriptive norms and PA intentions. College students ( $N=345$ ) in an introductory kinesiology course completed validated surveys. Descriptive norms were related to PA intentions and this relationship was partially mediated by injunctive norms, outcome expectations, and group identity. Additionally, exercise self-identity fully mediated the relationship. The results highlight the importance of fostering high levels of exercise self-identity when structuring environments to promote PA.

An experimental design was used in the second study to investigate the influence of positive and negative normative information on the performance of an exercise endurance task. College students ( $N=102$ ) were randomly assigned to receive positive or negative normative information, or no information, concerning expectations for their performance. Individuals who received positive feedback performed better than those who received negative feedback and

those who did not receive normative information. The provision of positive normative information also produced an increase in self-efficacy for the task.

Taken together, the findings from these studies provide insight into ways that social norms should be structured to promote physically active lifestyles. A focus on positive normative information and promoting exercise self-identity are key factors in this process, and these studies suggest that understanding the role of self-efficacy is also an important concern.

## CHAPTER 1: INTRODUCTION

Benefits of a physically active lifestyle including decreased risk for cardiovascular disease, diabetes, and certain kinds of cancer have been well documented in the physical activity (PA) literature (Center for Disease Control [CDC], 2009; Lautenschlager et al., 2008). Additionally, individuals who are active report positive mental health benefits and a higher quality of life as they age (Lautenschlager et al., 2008). Despite the extensive benefits associated with PA, less than 50% of American adults meet the recommendation of 150 minutes of PA per week (CDC, 2009). In light of the concerns related to physical inactivity, it is important to find ways to structure environments to promote PA. Social norms provide a framework for exploring factors that influence decisions to be physically active and are conceptualized as an individual's perception of peer behavior and peer approval of behavior (Ajzen, 1985; Ajzen, 1991; Cialdini, Reno, & Kallgren, 1990)

The development of the theoretical basis for the investigation of social norms is grounded in the evolution of several frameworks. Initially, social norms were defined and explored within larger behavioral theories such as Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) (Ajzen, 1991). Using both the TRA and TPB, subjective norms have been explored in a diverse array of settings. The Focus Theory of Normative Conduct (FTNC) evolved from TPB providing researchers a theoretical framework focused solely around social norms (Cialdini, Reno, & Kallgren, 1990). The FTNC then extended the conception of subjective norms by delineating norms along two dimensions. The first dimension differentiated norms as either descriptive or injunctive. Descriptive norms are defined as what an individual perceives others around him/her are commonly doing (Cialdini et al., 1990). Injunctive norms are defined as the perception of the approval or disapproval of important other individuals (i.e. my friends

think it is great that I go to the gym regularly). The second dimension characterizes the referent group of the norming factor as either proximal or distal (Borsari & Carey, 2003). Proximal norms are defined as the norms of close friends (i.e. my friends go to the gym regularly), while distal norms are defined as the norms of a larger population (i.e. students at my university go to the gym regularly). These dimensions produce four types of norms: descriptive proximal, descriptive distal, injunctive proximal and injunctive distal.

Injunctive and descriptive norms are constantly surrounding individuals, but they do not influence individuals' behavior until activated by "triggers." A trigger is defined as a prompt an individual sees or hears that causes the individual to become increasingly aware of the norms in their environment. Triggers activate both injunctive and descriptive norms, and the more salient or powerful the trigger is the more likely the norm that is triggered will influence a behavior (Cialdini et al., 1990).

Theory of Normative Social Behavior (TNSB) evolved from the FTNC as researchers attempted to better explain the underlying mechanisms that moderate the relationship between descriptive norms and behavioral intention. The TNSB asserts that descriptive norms have a direct influence on behavioral intention that is moderated by three normative mechanisms: injunctive norms, outcome expectations and group identity (Rimal & Real, 2005).

Although researchers have investigated how social norms influence a variety of behaviors, the domain of PA has not been fully explored. The focus of this dissertation is to apply social norms theories to investigate how normative information influences PA intentions and exercise behaviors. In the first study, using the TNSB as a framework, interrelationships among social norms, exercise identity, group identity, outcome expectations, and PA intentions are explored in a correlational design. Specifically, the focus of the study is to explore the role of



injunctive norms, exercise identity, group identity, and outcome expectations as mediators or moderators in the relationship between descriptive norms and PA intentions. In the second study, an experimental design is used to investigate the influence of positive and negative normative information on the performance of an exercise endurance task. Taken together, the findings from these studies provide insight into ways that social norms should be structured to promote PA and exercise behavior.

## CHAPTER 2: EXPLORING THE RELATIONSHIPS AMONG SOCIAL NORMS, IDENTITY, OUTCOME EXPECTATIONS, AND PHYSICAL ACTIVITY

Social norms provide a framework for exploring factors that influence decisions to be physically active (Ajzen, 1985; Ajzen, 1991). Interest in social norms gained traction as the Theories of Reasoned Action (TRA) and Planned Behavior (TPB) were applied as frameworks to understand behavior change. Subjective norms are an important component in those approaches, but much of the research exploring norms within the frameworks of TPB suggested that norms were less influential moderators of behavioral intention than behavioral beliefs or control beliefs (Kimiecik, 1992). More recent research, however, has demonstrated that norms constitute a very complex construct that may have a more significant role than originally recognized (Rimal & Mollen, 2013). Newer models stemming from the TPB that incorporate a more sophisticated conceptualization of social norms reveal norms account for a higher percentage of the variance in behavioral intention than previously thought (Smith-McLallen & Fishbein, 2008).

The Focus Theory of Normative Conduct (FTNC) evolved from TPB provides a theoretical framework focused solely around social norms (Cialdini, Reno, & Kallgren, 1990). Norms are differentiated in the FTNC norms as either descriptive or injunctive. Descriptive norms are defined as what an individual perceives others around him/her are commonly doing (Cialdini et al., 1990). Injunctive norms are defined as the perception of the approval or disapproval of important other individuals (i.e. my friends think it is great that I go to the gym regularly). Within this framework, both injunctive and descriptive norms are conceptualized as direct influences on behavioral outcomes.

Theory of Normative Social Behavior (TNSB) evolved from the FTNC as researchers attempted to better explain the underlying mechanisms that moderate the relationship between descriptive norms and behavioral intention. The TNSB asserts that descriptive norms have a

direct influence on behavioral intention that is moderated by three normative mechanisms: injunctive norms, outcome expectations and group identity (Rimal & Real, 2005). Rather than being an independent influence on behavior, injunctive norms are conceptualized in TNSB as moderating the relationship between descriptive norms and behavior.

It is recognized in the TNSB that the relationship between descriptive norms and behavior is not a simple, direct effect. In addition to examining injunctive norms as a moderator of the relationship between descriptive norms and behavioral intention, it is acknowledged that other variables have an effect on that relationship. Outcome expectations and group identity work as mechanisms that could also be influential as a moderator in the model.

Outcome expectations are operationalized in three categories: benefits to self, benefits to others, and anticipatory socialization (Rimal & Real, 2005). Benefits to self in this model are grounded in concepts from Bandura's (1977) social cognitive theory and are defined as "beliefs that his or her actions will lead to benefits" (Rimal & Real, 2005, p. 393). Benefits to others are evident when an individual perceives a peer is attaining a positive outcome by participating in a given activity (Rimal, 2008; Rimal & Real, 2005). Anticipatory socialization, the third type of outcome expectation, is the outcome expectation that a behavior will serve as a social lubricant. Social lubricants are regarded as behaviors that help ease an individual's transition into an unfamiliar social setting (Rimal & Real, 2005).

The third normative mechanism, group identity, is defined as "individuals' aspirations to emulate referent others and the extent to which they perceive similarity between themselves and those referents" (Rimal & Real, 2005, p. 395). Within the TNSB model, group identity consists of two facets, similarity and aspiration. Similarity refers to an individual's perception that a given group of people resemble themselves (Rimal & Real, 2005). The underlying mechanism is

that, as the individual's feelings of identity with a group increase, the desire to conform to group behavior increases to maintain their position in the group (Rimal, 2008). Aspiration addresses the motive of the individual to conform to a social referent group they desire to be a part of, but one in which they have not yet been accepted. Also referred to as modeling, individuals believe that dressing and acting like the group they aspire to be a part of will aid in their pursuit to be accepted as part of this group (Rimal & Mollen, 2013).

The evidence that social norms influence a wide range of health behaviors is robust, so a logical extension of these frameworks is to explore the relationship between social norms and PA. Research focused on social norms and PA is relatively sparse. Despite the fact that PA has not been a strong focal point in social norms research, there is evidence that norms are related to PA behaviors (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010; Lee, 2011; Lu et al., 2014). For example, Randazzo and Solmon (2015) found that normative perceptions of close peers were related to an individual's intention to be physically active. Also, factors such as self-identity and self-efficacy have been identified separately as variables influencing the relationship between social norms and PA (Lu et al., 2014; Yun & Silk, 2011). Lu et al. (2014) examined relationships among self-efficacy, social norms and PA in adolescents and discovered that both injunctive norms and self-efficacy predicted PA. Additionally, self-efficacy partially mediated the relationship between norms and PA among girls and fully mediated the relationship among boys.

This study, building on current social norms research by examining the relationship between normative perceptions, self-efficacy, self-identity, outcome expectations, value, and PA simultaneously, can advance this area of research in three ways. First, findings from this study can guide the development of normative interventions by identifying situations that are more

conducive for effective normative programming. For example, if social norms are found to significantly influence PA habits among college students with low self-identities, this would guide researchers to focus a social norm campaign on groups of students who possess lower exercise self-identities. The current literature on this area is very sparse. Yun and Silk (2011) found that proximal norms, both descriptive and injunctive, were related to intention to exercise and concluded that self-identity was a significant moderator in that relationship. These results are promising, but to better understand how social norms influence behavior more investigation is needed.

Second, this study explores the normative mechanisms in the relationship between descriptive norms and behavioral intentions. From the inception of a more complex conceptualization of social norms in the TNSB, researchers have focused on the degree to which social norms influence behavior and what factors moderate and mediate that relationship (Rimal & Real, 2005). Findings support the conclusion that injunctive norms are a moderator between descriptive norms and behavior (Rimal & Real, 2005; Rimal, 2008). The applicability of the TNSB framework and the role of the normative mechanisms between descriptive norms and PA behavior has not been explored. It is important to test the TNSB in a PA context, and to more fully explore the moderating role of factors that have been identified as normative mechanisms including injunctive norms, self-identity, group identity, and outcome expectations. Additionally, there is a need to clarify whether these mechanisms function as moderators, or if the role is actually one of mediation. Understanding how variables moderate and/or mediate relationships helps to explain how social norms affect behavior.

Moderation occurs when the magnitude and direction of the relationship between an independent variable (IV) and dependent variable (DV) depends on a third variable. As

illustrated in figure 2.1, when moderation exists, the relationship between the IV and DV is a direct relationship, but the strength of the relationship varies depending on the moderator (Hayes, 2013). For example, Yun and Silk (2011) found that the relationship between perception of peer healthy food choices and an individual's own healthy food choices was moderated by self-identity as a healthy eater. Specifically, the lower the individual's self-identity, the greater the influence of descriptive norms affected their food choices (Yun & Silk, 2011). In this example the individual's level of self-identity as a healthy eater determined how much the individual's perception of what others ate affected what they ate.

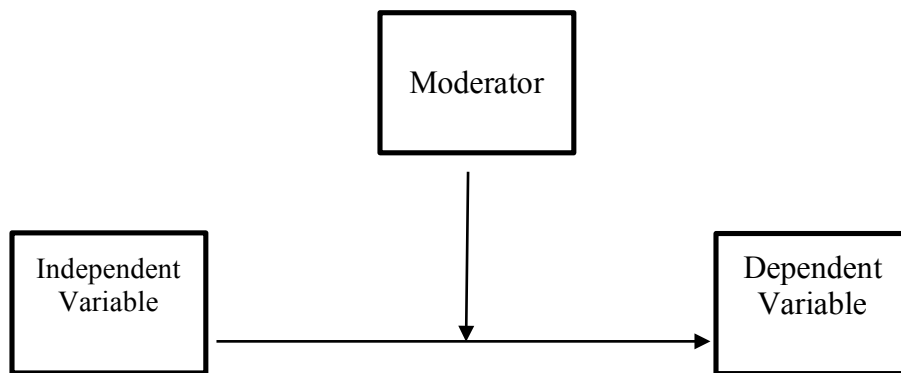


Figure 2.1. Conceptual model of moderation.

Mediation occurs when an IV causes variation in the mediating variable (Me) which in turn causes variation in the DV. As illustrated in figure 2.2, there is a relationship between the IV and DV, but a mediational analysis can reveal that the true effect occurs through the mediator. An example of mediation is found in a study by Lu (2012) where relationship between peer norms and PA in boys was fully mediated by self-efficacy. That is, the boys' perceived norms for PA affected their personal self-efficacy, which then influenced their decisions to be physically active. Although there appears to be a direct relationship between norms and intentions to be

active, when self-efficacy is included in the model it becomes apparent that the effect is not direct, in that the variance in decisions to be active is actually attributed to self-efficacy.

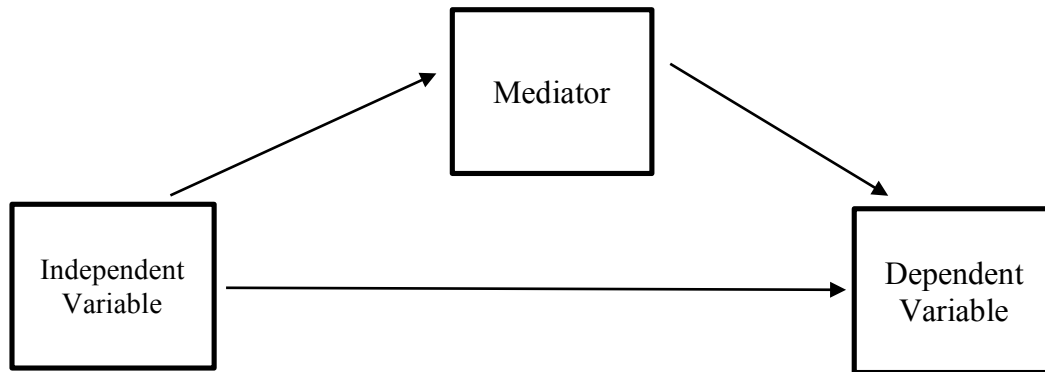


Figure 2.2. Conceptual model of mediation.

Third, a clearer understanding of the roles that social norms, self-identity, group identity, and outcome expectations cumulatively play in decisions to be physically active provides a more robust explanation of why similarly constructed social norm interventions have differing degrees of effectiveness at increasing PA. For example, Priebe and Spink (2012) conducted a two-part study examining the use of descriptive norm triggers to increase PA. In study one, individuals at a business office were assigned to receive different types of norm messages via e-mail. E-mail messages containing a normative trigger were more successful than non-normative messages in increasing mild activity. In the second study, Priebe and Spink (2012) attempted to extend the previous study by testing the effect of descriptive norm emails on college students. With this population, however, norm messages did not have a greater impact on student PA levels than the non-normative messages.

Although there is a large degree of generalizability across behaviors explored through the frameworks of FTNC and TNSB, studies such as the one by Yun and Silk (2011) demonstrate

the need for research that is specific to a particular behavior. They found that the degree to which norms influenced intention to make healthy eating choices differed from the degree norms influenced PA intentions. This demonstrates the need to explore social norms related to PA to gain a deeper understanding of how social norms about PA relate to behavior. Findings from this study aim to provide a more accurate depiction of the relationship between social norms and PA, as well as increasing our understanding of normative mechanisms as they relate to PA. The purpose of this study was to explore the nature of the relationship between social norms, self-identity, group identity, outcome expectations, and behavioral intention to be physically active in college undergraduate students. Specifically, the TNSB was used as a framework to explore the moderating and mediating roles of injunctive norms, outcome expectations, group-identity and exercise self-identity in the relationship between descriptive norms and behavioral intention.

## Methods

### Participants

The participants for this study were 345 (30.4% males, 69.3% females, and .3% unreported, *M* age=19.33 years) undergraduate students from a large introductory Kinesiology course at a university in the Southeastern United States. They were predominantly underclassmen [58.3% (201) freshmen; 26.1% (90) sophomores; 11.9% (41) juniors; 2.9% (10) seniors; .9% (3) unreported] and Caucasian [ethnicity: 19.1% (66) African American; .6% (2) American Indian; 4.3% (15) Asian; 71.6% (247) Caucasian; .3% (1) Pacific Islander; 4% (14) other/unreported] ethnicity [4.6% (16) Hispanic; 95.1% (312) Non-Hispanic; 4.9% (17) unreported], with a fairly equal distribution of on campus/off campus housing [46.1% (159) on campus; 51.3% (177) off campus, 2.6% (9) unreported]. Students who voluntarily participated in the study were offered extra credit in the class for participation.



## Instrumentation

A questionnaire consisting of demographic information and six scales was distributed to each participant. Demographic information included: age, gender, race, academic classification, and residence (on campus / off campus).

Social Norms. Social norms were assessed by adapting Park and Smith's (2007) instrumentation for measuring perceptions of PA norms. In their study they explored both personal (proximal) and societal (distal norms). Normative reference points (e.g. proximal, distal) were not specified within Rimal and Real's (2005) TNSB model. When examined in relation to behavior, proximal norms have been established as a stronger influence on intention than distal norms (Yun & Silk, 2011) so only proximal descriptive and injunctive norms were examined (i.e. asking individual's perception of close friends as opposed to their perception of a larger population). This measure consists of six items measured on a 7-point Likert scale (1=strongly disagree; 7=strongly agree) with three questions for each norm type. Sample items for each norm were: a) descriptive norms: "Most of my friends exercise"; b) injunctive norms: "Most of my friends would endorse my being physically active."

Exercise self-identity. Exercise self-identity was measured with four items from instrumentation used by Yun & Silk (2011). Sample items are: "I think of myself as the type of person who is concerned about the long-term effects of my exercise choices" and "I think of myself as someone who generally thinks carefully about the health consequences of my exercise choices." The response scale is a 7-point Likert scale (1=strongly disagree; 7=strongly agree).

Group identity. The group identity measure was adapted from Rimal and Real (2005) and assessed both the level the participant identified with his/her peers who exercise and, the degree to which he/she aspired to be part a group of college students who exercised. It consists of eight

items, with four items related to group aspiration (e.g., “I think my friends who exercise regularly are inspiring”) and four items related to perceived group similarity (e.g., “I think my friends who exercise regularly have values that are similar to my own”). Items are measured on a 7-point Likert scale (1=strongly disagree; 7=strongly agree). The similarity and aspiration items were averaged to generate a single score.

Outcome expectations. Outcome expectations were assessed using the Resnick, Zimmerman, Orwig, Furstenberg, and Magaziner (2000) outcome expectations for exercise scale. It consists of nine items measured on a 5-point Likert scale (1=strongly disagree; 5=strongly agree) with two subscales: physical benefits and mental benefits. The five items pertaining to physical benefits include statements such as “exercise makes my muscles stronger” and “exercise helps make me feel less tired.” The four items pertaining to expected mental benefits include statements like “exercise makes my mood better in general” and “exercise makes me more alert mentally.” The nine items are averaged together to derived one score.

Exercise intention. Exercise intention was measured using Ajzen and Madden’s (1986) Measure of Exercise Intention with participants indicating their intention to exercise at least three times a week over the next month. This measure included three items such as “I intend to exercise at least 3 times a week during the next month.” Responses were measured on a 7-point Likert scale (1= very unlikely; 7 = very likely).

Self-reported PA. PA was assessed using the Leisure-time Exercise Questionnaire (LTEQ, Godin & Shepard, 1985). Participants reported their PA over the previous week on this four-item questionnaire. Participants are required to recall the frequency they participated in strenuous, moderate, and mild bouts of PA of at least 15 minutes during the previous seven days. The following formula is used to generate a weekly leisure-time activity score:

$$\text{METs} = (\text{strenuous} \times 9) + (\text{moderate} \times 5) + (\text{mild} \times 3)$$

On the last item, participants estimate how often during a seven day period they engage in regular activity long enough to work up a sweat (1= often; 2= sometimes; 3 never).

### Procedures

Following IRB approval, the survey was administered to students during a regularly scheduled class. The researcher provided a brief overview of the study explaining there were no right or wrong answers and stressing the importance of reading each item carefully and answering honestly. Students provided informed consent prior to participating in the study. Data were collected anonymously, in that names were not recorded on the surveys.

### Data Analysis

Data were analyzed with the use of SPSS statistical software. First data were tested for possible outliers using *z* scores and missing data was addressed through a statistical means test in which the missing item was replaced with the average of the two or more present items within the measure. Descriptive data including simple correlations were then examined.

Next, a series of multiple regression analyses were used to test whether or not injunctive norms, exercise self-identity, group identity, and outcome expectations, moderate the relationship between descriptive norms and intention to be physically active. First, the IV (descriptive norms) and the potential moderators (Mo) were centered on their means as recommended by Aiken and West (1991). Next, the interaction variables were created by multiplying the IV by the Mo. Then, a multiple regression was run with IV, Mo and the interaction term predicting the DV. If the interaction term was significant in the regression model, then the variable demonstrated moderation. The process was repeated with each potential moderator.

Then tests of mediation were conducted. Data were analyzed according to the four requirements for mediation outlined in Baron and Kenny's (1986) *causal steps approach*. Again, descriptive norms were the IV, PA intention was the DV, and injunctive norms, exercise self-identity, group identity and outcome expectations were tested as potential mediators (Me) in separate analyses. First a simple regression of Y (DV) on X (IV) was conducted to confirm that the IV is correlated with the DV. Next, a simple regression of Me on X was run to confirm the IV is associated with the potential Me. Then a simple regression of DV on Me was conducted to confirm that the Me was correlated with the DV. In the final step, a multiple regression is conducted with the IV and Me as predictors. The level of significance in step one (DV on IV) was compared to the significance level of step four (DV on IV and Me). If the IV is no longer significant when the Me is entered into the model, this indicative of full mediation. If, however, the relationship was still significant, but the Beta weight decreased significantly, this suggests partial mediation. The causal steps approach is presented in figure 2.3.

Where full or partial mediation was found a Sobel's (1986) test and bootstrapping were conducted to generate confidence intervals, kappa squared statistics and alpha levels to examine the indirect effect (Preacher & Hayes, 2008; Preacher & Kelley, 2011). An alpha level of  $<.05$  and a confidence interval not including zero were further indication of mediation and the kappa squared statistic was interpreted as the effect size of the indirect effect. The steps following the causal steps approach were recommended by Hayes (2009) as a way to quantify the mediation effect as opposed to strictly confirming mediation based on the hypothesis tests. This analysis process was conducted for each potential mediator.

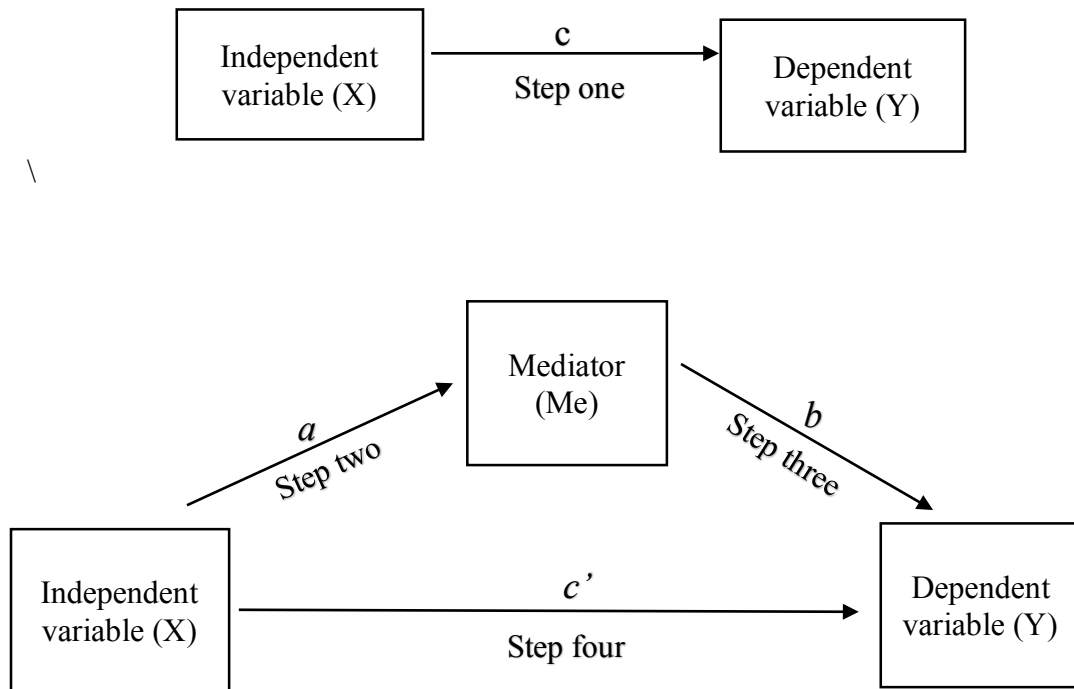


Figure 2.3. Plan for mediation analysis

### Results

Means, standard deviations, Cronbach's alpha reliability coefficients, and simple correlations for all variables are reported in table 2.1. The reliability estimates indicate that all scales used for analysis in the study demonstrated acceptable reliability, ranging from .75 to .91 (Hinkle, Wiersma, & Jurs, 2003). Simple correlations revealed a positive pattern of relationships among the variables. Consistent with theoretical predictions, descriptive norms are positively associated with injunctive norms, exercise self-identity, group identity, outcome expectations, exercise intention, and self-reported PA. Examination of the correlation matrix reveals that exercise self-identity exhibited moderate correlations with descriptive and injunctive norms, group identity, outcome expectations, and self-reported PA, and a strong relationship with

exercise intention (Hinkle et al., 2003). Exercise intention was moderately associated with self-reported PA, supporting the use of exercise intention as the outcome variable.

Table 2.1 Descriptive statistics for study variables

Variable	1	2	3	4	5	6	7
1. Descriptive Norms							
2. Injunctive Norms	.41*						
3. Exercise Identity	.42*	.52*					
4. Group Identity	.39*	.44*	.47*				
5. Outcome Expectations	.24*	.38*	.53*	.38*			
6. Exercise Intention	.34*	.44*	.74*	.37*	.48*		
7. Self-Reported PA	.34*	.25*	.44*	.18*	.25*	.47*	
Mean	4.66	6.01	5.63	5.53	4.59	5.81	59.70
SD	1.36	.92	1.09	1.08	.50	1.32	25.23
Cronbach's $\alpha$	.78	.88	.84	.75	.89	.91	

\*  $p < .001$

### Tests of Moderation

A central purpose of this study was to test whether or not injunctive norms, group identity, outcome expectations, and exercise self-identity moderated the relationship between descriptive norms and intention to be physically active. This was tested through a series of hierarchical regression equations using centered means. The first block for each analysis remained constant with descriptive norms entered as the independent variable. Descriptive norms

accounted for 11.5% of the variance in intention to be active [ $F(1,343) = 44.68, p < .001$ ]. In the second block each potential moderator was entered, followed by the interaction term. A separate analysis was conducted for each potential moderator. Summary statistics for the models are presented in table 2.2

Injunctive norms. Descriptive norms and injunctive norms accounted for 22.6% of the variance [ $F(2, 342) = 50.00, p < .001$ ]. The interaction variable descriptive norm x injunctive norm was added in the next step but did not improve the model [22.7% variance accounted for,  $F(3,341) = 33.44, p < .001$ ]. Since the interaction variable did not contribute significantly to the model ( $\beta = .035, p = .50$ ), it can be concluded that injunctive norms do not moderate the relationship between descriptive norms and intention to be physically active (Aiken & West, 1991).

Exercise self-identity. Descriptive norms and exercise self-identity together accounted for 54.2% of the variance in intention to be physically active [ $F(2, 342) = 202, p < .001$ ]. The interaction variable descriptive norms x exercise self-identity added in the next step [ $F(3,341) = 135.7, p < .001$ ] did not significantly improve the model with 54.40% of the variance accounted for. Again, the interaction variable did not contribute significantly to the model ( $\beta = -1.41, p = .16$ ) and it can be concluded that exercise self-identity does not moderate the relationship between descriptive norms and intention to be physically active (Aiken & West, 1991).

Group identity. The model with descriptive norms and group identity predicted intention to be physically active [ $F(2,342) = 37.35, p < .001$ ] accounting for 17.9% of the variance. In the next step, the interaction variable descriptive norm x group identity did not improve the model [ $F(3,341) = 25.20, p < .001$ ] with the model accounting for 18.10% of the variance. The interaction variable did not contribute significantly to the model ( $\beta = -0.49, p = .37$ ) indicating that group

identity does not moderate the relationship between descriptive norms and intention to be physically active (Aiken & West, 1991).

Outcome expectations. Descriptive norms and outcome expectations predicted intention to be physically active [ $F(2,342) = 66.59, p < .001$ ], accounting for 28% of the variance. As before, the addition of the interaction variable descriptive norm x outcome expectations did not improve the model [ $F(3,341) = 45.36, p < .001$ ], accounting for 28.50% of the variance. The interaction variable did not contribute significantly to the model ( $\beta = -0.08, p = .12$ ) and it can be concluded that outcome expectations do not moderate the relationship between descriptive norms and intention to be physically active (Aiken & West, 1991).



Table 2.2. Tests of moderation

	Unstandardized Coefficients		Standardized Coefficients		t	p	Block	Total
	B	Std. Error	Beta				$\Delta R^2$	$R^2$
Block 1 DN	.330	.049	.339		6.68	.001	11.5%	11.5%
Block 2 Mechanisms*								
2Ai IN	.525	.075	.365		7.01	.001	11.1%	22.6%
2A ii IN X DN	.033	.049	.035		.68	.497	.01%	22.7%
2Bi EI	.872	.049	-.054		11.83	.001	42.7%	54.2%
2Bii EI X DN	-.042	.031	-.054		-1.41	.16	.02%	54.4%
2Ci GI	.335	.065	.275		4.44	.001	6.4%	17.9%
2Cii GI X DN	-.046	.048	-.049		-.963	.336	.02%	18.1%
2Di OE	1.11	.125	.418		8.86	.001	16.5%	28%
2Dii OE X DN	-.128	.083	-.076		-1.54	.124	.05%	28.5%

Note: DN = Descriptive Norms, IN = Injunctive Norms; EI = Exercise Self-Identity; GI = Group Identity; OE = Outcome Expectations

#### Tests of Mediation

Determining whether injunctive norms, exercise self-identity, group identity, and outcome expectations mediate the relationship between descriptive norms and intention to be physically active was tested in accordance with the four criteria for mediation outlined by Baron and Kenny (1986), Sobel's Test (1986), bootstrapping (Preacher & Hayes, 2008) and the use of

multiple regression analyses. Each potential mediator was tested separately. Step one for each of the analyses remains constant, with descriptive norms significantly predicting intention to be physically active [ $F(1,343) = 44.68, p < .001$ ], accounting for 11.05% of the variance

Injunctive norms. The model testing the mediation of injunctive norms is presented in Figure 2.4. In step two descriptive norms were a significant predictor of injunctive norms [ $F(1,343) = 67.88, p < .001$ ], accounting for 16.52% of the variance. In step three injunctive norms predicted intention to be physically active  $F(1,343) = 83.46, p < .001$ , accounting for 19.60% of the variance. In step four when injunctive norms were added to the model in step one (descriptive norms regressed on intention to be physically active) the model accounted for 22.60% of the variance [ $F(2,242) = 50.00, p < .001$ ]. When injunctive norms were entered into the model the standardized beta coefficient for descriptive norms decreased from 0.34 to 0.19. The magnitude of the mediating effects was  $Z = 0.14, p < 0.01$ , 95% CI (0.10, 0.20), with a moderate effect size ( $\kappa^2 = 0.14$ ; Preacher & Kelley, 2011). The significant but decreased effect of descriptive norms on intention in step four, considered in light of the combination of the significant mediating effect and a confidence interval that did not cross or include zero, suggests that injunctive norms partially mediate the relationship between descriptive norms and intentions to be physically active (Hayes, 2009; Preacher & Kelley, 2011).

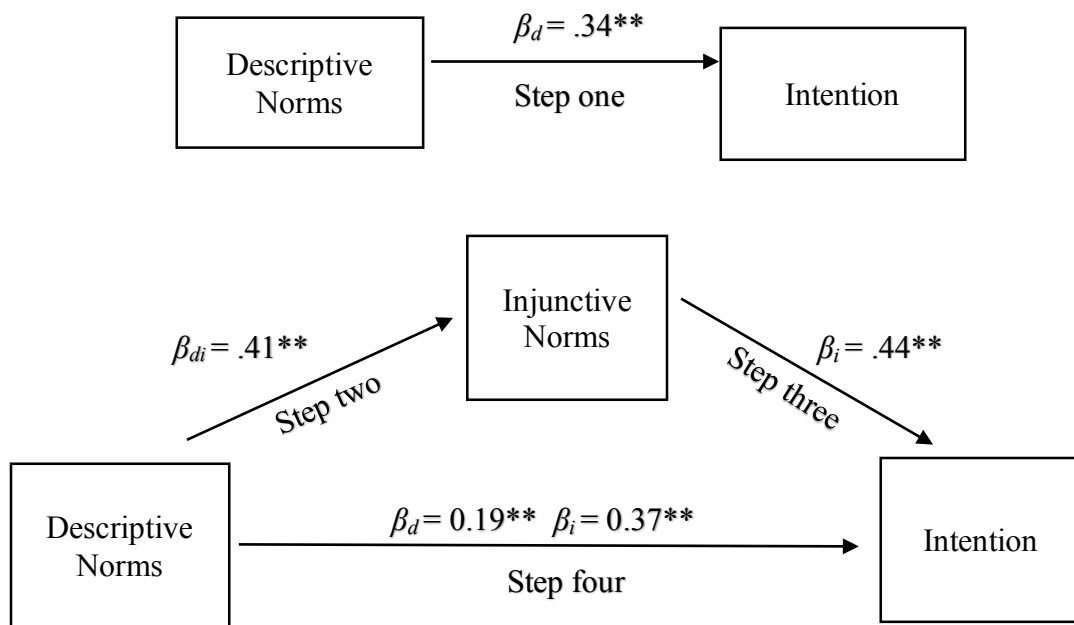


Figure 2.4. Testing mediation effect of injunctive norms.

Note:  $\beta$ -values are standardized beta coefficients from the stages of regression analysis run in the casual steps approach.

\* $p < .05$ ; \*\* $p < .01$

Exercise self-identity. The model testing the mediation of exercise self-identity is presented in Figure 2.5. In step two descriptive norms were a significant predictor of exercise self-identity [  $F(1,343) = 74.54$ ,  $p < .001$ ], accounting for 17.90% of the variance. Exercise self-identity was a significant predictor of intention to be physically active [  $F(1,343) = 403.54$ ,  $p < .001$ ] accounting for 54.10% of the variance in step three. When exercise self-identity was added to the model used in step one (intention to be physically active regressed on descriptive norms) the model accounted for 54.16% of intention to be physically active [  $F(2,242) = 202.00$ ,  $p < .001$ ] in step four. When exercise self-identity was added to the model used in step one (intention to be physically active regressed on descriptive norms) in step four, the model

accounted variance in intention to be physically active accounted for by the model increased from 11.05% to 54.16% [ $F(2,242) = 202.00, p < .001$  and descriptive norms was no longer a significant predictor. The standardized beta coefficient for descriptive norms decreased from 0.34 to 0.04. The magnitude of the mediating effects was  $Z = 0.30, p < 0.00, 95\% \text{ CI } (0.25, 0.40)$ , with a large effect size ( $\kappa^2=0.33$ ; Preacher & Kelley, 2011). The change of descriptive norms from significant in step one to not significant in step four, in combination with significant mediating effects and a confidence interval that did not cross or include zero, indicates that exercise self-identity fully mediates the relationship between descriptive norms and intentions to be physically active (Hayes, 2009; Preacher & Kelley, 2011).

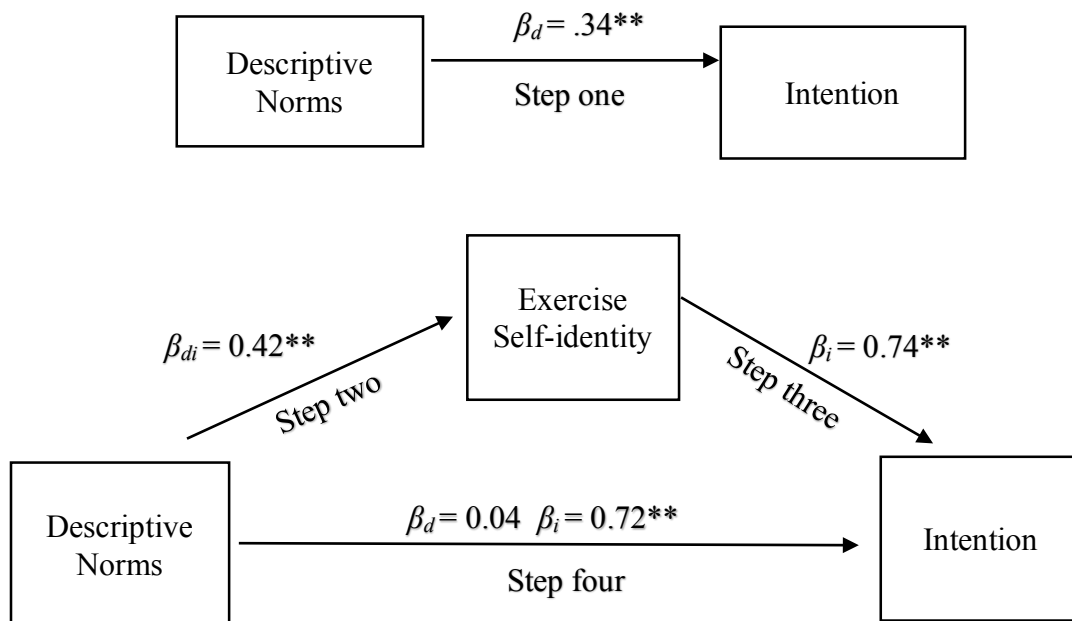


Figure 2.5. Testing mediation effect of exercise self-identity.

Note:  $\beta$ -values are standardized beta coefficients from the stages of regression analysis run in the casual steps approach.

\* $p < .05$ ; \*\* $p < .01$ .

Group identity. The model testing the mediation of group identity is presented in Figure 2.6. Descriptive norms significantly predicted group identity [ $F(1,343) = 62.94, p < .001$ ], accounting for 15.50% of the variance in step two. In step three group identity predicted intention to be physically active [ $F(1,343) = 53.10, p < .001$ ], accounting for 13.40% of the variance. In step four when group identity was added to the model in step one (intention to be physically active regressed on descriptive norms) the model predicted intention to be physically active [ $F(2,242) = 37.34, p < .001$ ], accounting for 17.92% of the variance. When group identity was entered into the model the effect of descriptive norms on intention to be physically active was still significant and the standardized beta coefficient for descriptive norms decreased from 0.34 to 0.23. The magnitude of the mediating effects was  $Z = 0.11, p < 0.00$ , 95% CI (0.06, 0.17), and a moderate effect size ( $\kappa^2=0.11$ ) was found (Preacher & Kelley, 2011). The significant but decreased effect of descriptive norms on intention in step four, in combination with significant mediating effects and a confidence interval that did not cross or include zero, suggests that group identity partially mediates the relationship between descriptive norms and intentions to be physically active (Hayes, 2009; Preacher & Kelley, 2011).

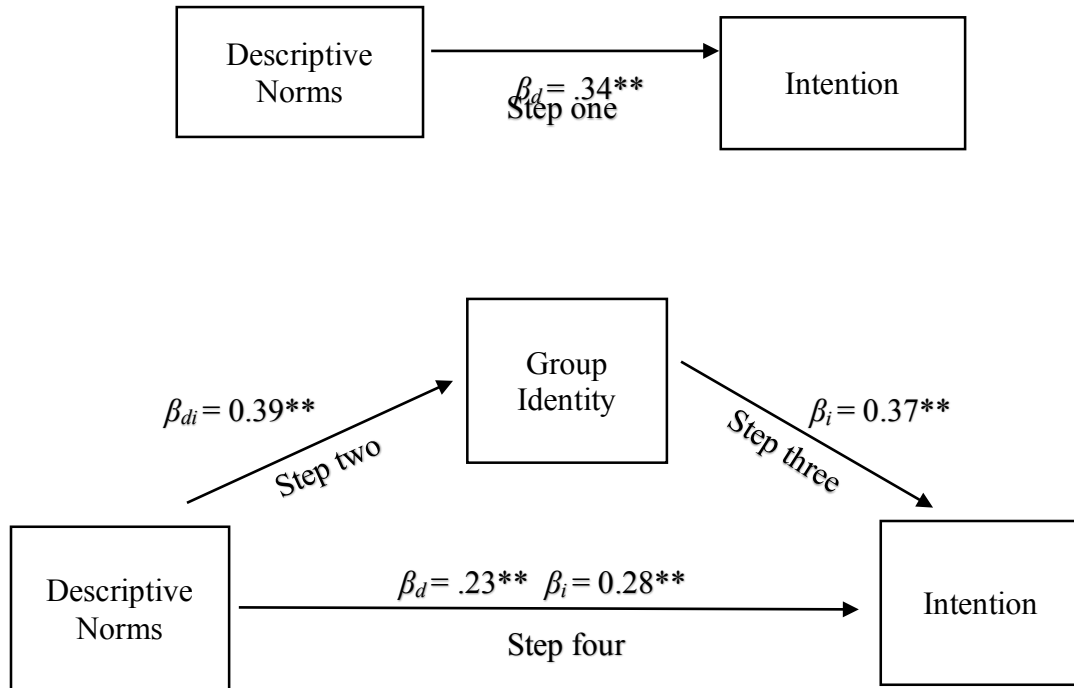


Figure 2.6. Testing mediation effect of group identity.

Note:  $\beta$ -values are standardized beta coefficients from the stages of regression analysis run in the casual steps approach.

\* $p < .05$ .; \*\* $p < .01$ .

Outcome expectations. The model testing the mediation of outcome expectations is presented in Figure 2.7. In step two descriptive norms predicted outcome expectations [ $F(1,343) = 20.42, p < .001$ ], accounting for 5.62% of the variance in outcome expectations. In step three outcome expectations predicted intention to be physically active  $F(1,343) = 100.00, p < .001$ , accounting for 22.60% of the variance in intention to be physically active. In step four when outcome expectations was added to the model in step one (intention to be physically active regressed on descriptive norms) and the model predicted intention to be physically active  $F(2,242) = 66.59, p < .001$ , accounting for 17.92% of the variance. When outcome expectations were entered into the model the effect of descriptive norms on intention to be physically active

was still significant. The standardized beta coefficient for descriptive norms decreased from 0.34 to 0.24. The magnitude of the mediating effects was  $Z = 0.10$ ,  $p < 0.00$ , 95% CI (0.05, 0.16), and a moderate effect size ( $\kappa^2=0.10$ ) was found (Preacher & Kelley, 2011). The significant but decreased effect of descriptive norms on intention in step four, in combination with significant mediating effects and a confidence interval that did not cross or include zero, suggests that outcome expectations partially mediates the relationship between descriptive norms and intentions to be physically active (Hayes, 2009; Preacher & Kelley, 2011).

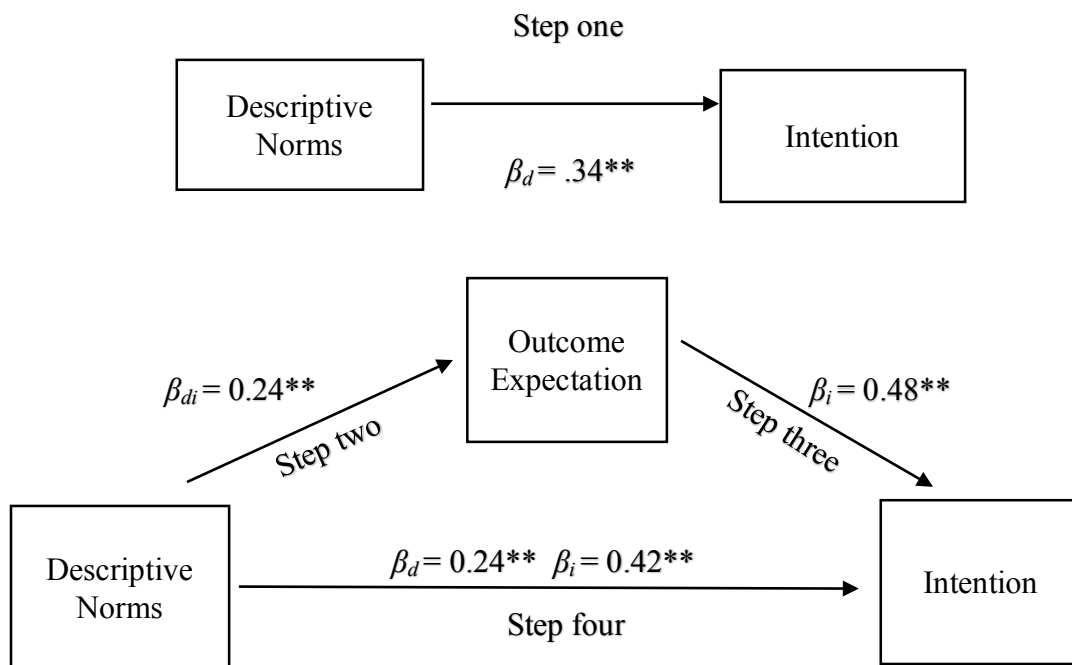


Figure 2.7. Testing mediation effect of outcome expectations

Note:  $\beta$ -values are standardized beta coefficients from the stages of regression analysis run in the casual steps approach.

\* $p < .05$ .; \*\* $p < .01$

## Discussion

Framed by the TNSB (Rimal & Real, 2005), the purpose of this study was to explore the underlying mechanisms through which descriptive norms influence intention to be physically active. Consistent with the findings reported by Yun and Silk (2011), the correlational analysis revealed that both injunctive and descriptive norms were associated with intention to be physically active. These results reinforce the idea that the perceptions of peers (both what they say and what they do) are related to intention to participate in a behavior. Additionally, the correlations revealed that injunctive norms had a slightly stronger relationship with intention to be physically active than descriptive norms. A unique aspect of this study was to include a measure of self-reported PA. It is of interest to note that while the strength of the association between descriptive norms and self-reported PA is the same as that with intention, the trend for injunctive norms is reversed. That is, rather than having a somewhat stronger relationship than the descriptive norms, the association between self-reported PA and injunctive norms is somewhat weaker. This effect is similar to correlations reported in Randazzo and Solomon (2015), where self-reported PA was associated with proximal descriptive norms but not with injunctive norms. Seemingly perceptions of what others approve or disapprove may have a stronger influence what people intend to do as compared to what they actually do. A major contribution of the TNSB (Rimal & Real, 2005) was to delineate descriptive and injunctive norms, but their relationship with behavioral intention has not been clarified through empirical research (Mollen, Rimal, Ruiter, & Kok, 2013).

Exercise self-identity had a strong relationship with intention to be physically active. This strong association was also reported by Yun and Silk (2011). Additionally, self-identity was moderately related to all other variables in the study. How the participants viewed themselves as



exercisers was associated with their norm perceptions, the strength of their group affiliation, their outcome expectations, and their self-reported PA. This robust pattern of relationships between self-identity and a variety of psychological concepts emphasizes the importance of exercise self-identity in the efforts to increase PA. Additionally these findings should highlight the importance of continuing to explore new ways to foster a strong sense of exercise self-identity in individuals.

The central focus of this study was to explore the mechanism through which descriptive norms influence intentions to be physically active. Injunctive norms, exercise self-identity, group identity, and outcome expectations were explored as possible moderators and mediators in this relationship. In this study, no variables emerged as moderators in the relationship between descriptive norms and behavioral intentions. This is in contrast to previous research and the theoretical predictions based on TNSB. Investigations of other health behaviors such as alcohol use have supported TNSB, in that injunctive norms (Rimal, 2008; Rimal & Real, 2003), group identity and outcome expectations (Rimal, 2008; Rimal & Real, 2003, 2005) were moderators in the relationship. Notably in the Rimal and Real (2005) study injunctive norms did not moderate the relationship, another indication that the interaction between descriptive and injunctive norms needs clarification. Additionally in that study, the moderating effect for group identity and outcome expectations was not strong. In the PA domain, Yun and Silk (2011) found that exercise self-identity did moderate the effect of social norms on PA intentions. Specifically, when exercise self-identity was strong social norms had little effect on intentions, and when exercise identity was not well established norms were more influential. Injunctive norms and outcome expectations were not tested as moderators in that study.

Although no variables emerged as moderators in this study, results of the mediational analyses revealed that the relationship between descriptive norms and intention to be physically

active was partially mediated by injunctive norms, group identity, and outcome expectations and fully mediated by exercise self-identity. The identification of injunctive norms and outcome expectations as partial mediators is consistent with findings reported by Rimal (2008). The emergence of group identity as a partial mediator has not previously been reported. These findings support the conclusion that descriptive norms partly operate by affecting what individuals believe others approve of, how strong the group affiliation is, and what they perceive to be the consequences or outcomes of specific behaviors. Therefore, if practitioners want their participants to “buy into” a PA program aimed at increasing PA, it would be advantageous for the practitioner to emphasize to individuals that their peers approve of and/or support their participation, that others similar to them are participating in similar programs, and that engaging in the behavior will produce positive outcomes.

The full mediation of exercise self-identity in the relationship between descriptive norms and intention to be physically active is an important finding in this study. Previously, researchers exploring social norms have operated under the assumption that descriptive norms would not directly affect how individuals view themselves, so the notion of self-identity as a mediator of social norms had not been explored (Rimal, 2008). The identification of self-identity as a full mediator, coupled with group identity as a partial mediator, provides evidence that our perceptions of others (descriptive norms) affect intentions through directly affecting how we view ourselves and our aspirations to be part of a group.

Exercise self-identity emerged in this study as the most powerful influence on intentions to be physically active as well as self-reported PA. That, coupled with the mediating role of self-identity in the relationship between descriptive norms and behavioral intentions, highlights the influential role self-identity plays in decisions to be physically active. Based on this, a

compelling implication for practitioners is that they should focus on creating an environment that fosters high levels of self-identity as an exerciser to foster engagement in PA.

The findings from this study provide insight into the relationship between descriptive norms and intention to be physically active. In light of initial evidence that exercise self-identity fully mediates that relationship, future research should explore the nature of the relationship between descriptive norms and self-identity as well as the underlying process that affect that relationship. This could yield valuable information for practitioners about the potential of utilizing normative information as a way to foster higher levels of exercise self-identity. Lu et al. (2014) in their study of social norms and PA in adolescents found that self-efficacy mediated the relationship between peer norms and PA partially for girls and fully for boys. Although not included in this study, exploring the network of relationships among social norms, self-identity, and self-efficacy is also an avenue for further investigation.

The seminal findings on meditation further highlight the complex nature of the relationship between descriptive norms and intention. The results support the conclusion that a better understanding of social norms has the potential to guide efforts to create social environments that promote decisions to be physically active.

### CHAPTER 3: EXPLORING THE EFFECTS OF POSITIVE AND NEGATIVE NORMATIVE INFORMATION ON AN ENDURANCE TASK

Field-based studies have provided evidence that interventions disseminating information about social norms can increase positive health related behaviors and decrease undesirable behaviors (Mollen, Rimal, Ruiter, & Kok, 2013). Few researchers however, have tested social norm interventions in field settings designed to increase PA. Though scant, evidence supporting the use of social norms to increase PA does exist. Generally, field-based research into social norm and PA interventions has used a pre-posttest design that relies on self-reported PA as the outcome variable (Priebe & Spink, 2012, 2015). For example, Priebe and Spink (2015) tested the effectiveness of descriptive norm messages designed to increase light PA and decrease sedentary behavior in the work place. Baseline PA levels and reasons for being active were assessed. In their intervention, they varied the norm messages delivered via e-mail with regard to the reference group characteristics, outlining four conditions. Results revealed that descriptive norm messages could increase light PA and decrease sedentary behavior.

Though most studies focused on social norms have relied on self-reports of PA, there are a few examples of studies that have incorporated objective measures of PA in their designs. Burger and Shelton (2011) conducted a study to test the effectiveness of descriptive norm information. They collected baseline data on stair usage at three strategically located elevators and then posted signs at two of the locations. One sign presented a descriptive norm trigger that 90% of individuals took the stairs instead of the elevator, while the other sign was informational in nature, touting the benefits of taking the stairs but not providing normative information. The third site served as a control condition. The usage of the elevator at the site where the descriptive norm was introduced decreased by 46% from the first to the second week, but there was no change in usage at either the control or informational sites.

Priebe and Spink (2014) used an experimental design to examine the influence of descriptive norm information on a muscular endurance task. Adults recruited from a Pilates studio were randomly assigned to either receive descriptive normative information or to the control condition. Individuals completed a maximum endurance plank followed by a rest period. During the rest period, individuals in the treatment condition were told that 80% of their peers were able to hold their second plank at least 20% longer than the first attempt, while the control condition was not given any normative information. Individuals who received the descriptive normative information held their plank longer on the second attempt than those in the control condition. When controlling for initial performance, the intervention group performed significantly better than the control group on the second trial. Additionally, the normative information was associated with increased task self-efficacy for the second trial.

While findings from Priebe and Spink (2014) make a valuable contribution to the norms and exercise literature, it is important to note that these findings on exercise cannot be directly generalized to norms and PA behaviors. This does not, however, mean that the findings relevant to performance on an endurance task cannot inform our understanding of how normative information acts to enhance or constrain decisions about PA, but instead that they should be interpreted with caution. An experimental design using an endurance task in a laboratory setting can provide insight into the effect that normative information has on an individual's willingness to exert effort.

The study by Priebe and Spink (2014) demonstrates properly activated norm triggers can produce increases in exercise effort and task self-efficacy (Priebe & Spink, 2014). Researchers have hypothesized that self-efficacy is influenced by social norms through the vehicle of vicarious experience which is one of the four sources of information influencing self-efficacy as

outlined in Bandura (1997). In the study by Priebe and Spink (2014) vicarious experience was invoked when researchers informed students that “80% of similar others held their second plank for at least 20% longer than their first plank” (Priebe & Spink, 2014, p. 493). Individuals provided with a descriptive norm message reported a higher post-manipulation self-efficacy score than those in the control group. To date, Priebe and Spink (2014) conducted the only study of its kind to test self-efficacy, social norms, and exercise. This initial work makes a significant contribution to the literature regarding how normative information can be used to promote effort, and provides a basis for extending this work to more closely examine how normative information affects behavior. It is clear that insight into how normative information affects self-efficacy is valuable, especially when findings that self-efficacy significantly predict exercise behavior (McAuley, 1993).

Another aspect of the influence of normative information that has not been explored is the effect of negative normative information. This is especially important in light of the preponderance of information presented in the media about high rates of physical inactivity. To date, the effect of norms highlighting that the majority of the population does not meet recommended levels of PA on PA engagement has not been explored. A study by Cialdini et al. (2006) provides some insight into how descriptive norms about the prevalence of negative actions can affect behavior. They introduced norm triggers in the form of signs posted around a park with the goal of decreasing petrified wood theft. Their descriptive norm trigger emphasized the fact that many past visitors had removed petrified wood from the park, while the injunctive norm trigger highlighted the fact that most park goers disapproved of wood theft. Instead of reducing theft, the message highlighting the high frequency of theft (i.e. that removing wood is a problem) resulted in an increase in wood theft in areas where those particular signs were posted.

Rather than decreasing the target behavior, the trigger activated the normative perception that the majority of people who visit the park are stealing wood, so stealing wood was not a big deal. In contrast, in areas where injunctive norm signs communicating disapproval of wood theft were introduced, wood theft decreased. In terms of norms and PA, attempts to motivate individuals to increase their PA by increasing their awareness that a large percentage of their peers are sedentary is providing negative normative information. While the goal of this approach is commendable, this message could actually be emphasizing that being sedentary is acceptable and part of the majority. Consequently, individuals may be less likely to be ostracized for being sedentary because it is the norm. The study by Cialdini et al. (2006) suggests that negative normative information may reinforce a negative behavior, but the effect of negative normative cues has not been explored in PA. The purpose of this study was to further explore the effects of normative triggers on exercise, extending the Priebe and Spink (2014) study by investigating the effect that messages about low performance have on decisions to exert effort on an endurance task.

The utility of this study is three fold. First, findings add to the literature on social norms and exercise providing valuable insight into the influence social norms exert on exercise effort. Second, findings from this study provide seminal data on the effects of descriptive negative norms on single bouts of exercise, providing direction for future interventions containing a normative trigger component. Third, the design provides a basis for a more thorough investigation of the effect of normative information on self-efficacy by including a baseline measure for comparison.

Based on normative principals outlined in FTNC and previous research by Priebe and Spink (2014), the following hypotheses were tested:

H1: Provision of positive normative information would increase performance on an exercise endurance task while provision of negative normative information would result in a performance decrement, as compared to the absence of normative information.

H2: Provision of positive normative information would increase self-efficacy on an exercise endurance task while provision of negative normative information would result in a decrease in self-efficacy, as compared to the absence of normative information.

## Methods

### Participants

The participants for this study were 102 undergraduate students [50% males and 50% females,  $M$  age=22.06 years] recruited from various Kinesiology classes at a large university in the Southeastern United States. The racial make-up of participants was 17% (17) African American, 3% (3) Asian, 74% (74) Caucasian, 1% (1) Pacific Islander, 5% (5) other/ unreported; ethnicity 4% (4) Hispanic, 63% (63) Non-Hispanic; 33% (33) unreported; with 93% (93) reporting they had performed a plank in the in last year. This sample size yielded an acceptable level of observed power (Power= .95). Participants were told that the purpose of the study was to establish norms for college students' performance on the abdominal endurance plank. They were randomly assigned to one of three groups: control group, positive normative information, and negative normative information. Thirty-four (17 males and 17 females) participants were assigned to each condition.

### Instrumentation

PAR-Q. The PA readiness questionnaire (PAR-Q) was used to screen participants before they participated in the study to eliminate participants who were at an increased risk of health problems during exercise (CSEP, 2002). This questionnaire consists of seven dichotomous



statements about recent health. Example items are “Do you feel pain in your chest when you are physically active?” and “Do you lose your balance because of dizziness or do you ever lose consciousness?” Individuals were required to answer “no” to all questions to participate in the study.

Plank self-efficacy. This measure was developed by Priebe and Spink (2014) to assess an individual’s level of confidence in their ability to hold a second abdominal plank. The plank self-efficacy tool consists of five items on an 11 point Likert scale measuring task self-efficacy for completing a second plank (0%= I definitely cannot; 100%= I definitely can) with sample questions such as “Rate your confidence in your ability to hold the second abdominal plank for 20% more time than you held the first plank.” Modifications in the scale were made to address the inclusion of negative normative information in this study. The modifications were tested during a pilot study and were found to be psychometrically appropriate. Additionally, the items were modified to provide an assessment of participants’ general level of efficacy to perform a plank. Again, five items were used with the 11 point Likert response scale, but the items were stated in terms of how confident participants were in their ability to hold an abdominal plank for a percentage of time (i.e. at least: 80% of the average, 90% of the average, the average, 10% longer than the average, and 20% of the average) as peers of the same and sex.

Plank peer norms. This measure was created by Priebe and Spink (2014) to assess an individual’s perception of the amount of time a peer of the same age, sex, and fitness level could hold an abdominal plank. The plank peer norm tool consisted of one item on a seven point Likert (decreased 40%; increased 40%) scale measuring normative perceptions with the question “What do you think happened when others like you (i.e., same age range, sex, and fitness level) performed their second timed plank hold?” (Priebe & Spink, 2014).

Manipulation check. This measure was developed by Priebe and Spink (2012) to assess the quality of the trigger used in the experimental group. The norm trigger manipulation consisted of four items on a seven point Likert scale (1=strongly disagree; 7=strongly agree) measuring message quality with questions such as “The information about others performance was... believable, relevant, easy to understand, persuasive” (Priebe & Spink, 2012, 2014).

### Procedures

Participants were tested individually. Each participant first completed the PAR-Q, consent form, and the pre-test survey, including demographic questions, experience with the abdominal plank, and initial self-efficacy. Each participant was then read the instructions verbatim by the researcher to ensure reliability of instruction quality. Following the instructions, each participant was shown a gender appropriate video of an individual performing an abdominal plank using proper form, and also demonstrating errors and improper form for clarity. Following the conclusion of the video each participant performed an abdominal plank and was asked to exert maximal effort (i.e., hold the plank as long as possible). Once the plank timer started the participant was given one warning if his/her torso and legs were no longer horizontally aligned (i.e. bending of the knees, raising the hips, or arching the back). The timer was stopped when either the participant said they were done, the participant displayed improper form after being warned once, or after five minutes was reached to protect against unnecessary strain on the participants’ shoulders or lower back. Participants who could hold a plank for five minutes were to have been excluded from the study, but this did not occur. The timer was not visible to the participants during either plank attempt and the researcher gave no feedback related to time until the second plank was completed. The only performance feedback the researcher provided was a single warning of improper form (if necessary) during each plank attempt.

Immediately following the first plank attempt participants were given a three-minute rest period. As the rest period began participants completed a brief survey measuring their self-efficacy in terms of how long they believed they could hold a second plank and their perception of how long they believed their peers could hold a second plank. Information provided during the rest period varied according to group assignment. The control group was simply reminded that at the end of the three-minute rest period they would be asked to perform a second maximal effort plank hold. The positive norm test group was informed that peers of the same age, gender, and similar skill level typically held their second plank for “at least 20% longer than they held their first plank.” The negative norm group was told their peers of the same age, gender, and similar skill level typically held the second plank for “less than 80% as long as they held their first plank.” With 30 seconds left in the rest period the participants completed a second self-efficacy assessment identical to the efficacy assessment they completed at the start of the rest period. Immediately following the three-minute rest period all participants completed a second maximal effort plank hold. After the completion of the second plank participants in the normative message groups completed a manipulation check to determine if participants found the normative information to be believable. Participants also completed a second survey measuring future plank self-efficacy. The steps in data collection are outlined in Table 3.1.

Table 3.1 Data collection steps

Preparation	Recruitment and Screening Completion of Informed Consent and PAR-Q General Instructions Demographic and pre-efficacy questionnaire Video of Plank Demonstration
Trial one	Completion of first plank
3 min Rest Period	Efficacy for second plank Perceptions of Peer Norms for Second Plank Normative information prompt according to group assignment Repeat Efficacy for Second Plank
Trail two	Completion of second plank
Post Surveys	Post –efficacy for plank Manipulation Check for groups who received feedback

### Data Analysis

Data were analyzed using SPSS statistical software. First data were checked for missing data and outliers. H1 was tested using of an analysis of covariance (ANCOVA). The time on the initial plank was the covariate, the independent variable was the group assignment, and the dependent variable was the time on the second plank. H2 was tested using two 3 (group) X 2 (time) repeated measures analysis of variance (RMANOVA). The dependent variables in the first RMANOVA were self-efficacy for the second plank prior to and after presenting the normative information. For the second RMANOVA initial efficacy for the plank and final efficacy were the dependent variables.

### Results

Prior to the presentation of normative information, participants were asked to report their perceptions of how they expected their peers would perform on their second plank attempt to

provide a reference point for the normative information that was to be provided. The frequency count of those responses is presented in Table 3.2.

Table 3.2. Perceptions of peer's plank 2 performance

What do you think happened when others like you performed the second plank?	Number of Responses
Decreased by 40%	6 (5.9%)
Decreased by 20%	40 (39.2%)
Decreased by 10%	42 (41.2%)
Same amount	8 (7.8%)
Increased by 10%	5 (4.9%)
Increased by 20%	1 (1%)
Increased by 40%	0 (0%)

The majority of participants indicated they expected that their peers had experienced a decrement in performance on the second attempt, with only 13.7% indicating that they expected either the same performance or an increase. This provides verification that the positive normative information provided was information that was incongruent with their prior expectations, and that the negative normative information (that most individuals decreased by 20%) tended to be either comparable to or lower than participants expectations. Descriptive data including means and standard deviations for experimental conditions are presented in table 3.3.

Table 3.3. Means and standard deviations for study variables

Variable	Positive Norm Condition Means (SD)	Negative Norm Condition Means (SD)	Control Condition Means (SD)	Grand Means (SD)
Initial Plank (sec)	106.04 (53.90)	114.50 (42.21)	98.89 (32.55)	106.48 (43.80)
Second Plank (sec)	101.29 (44.17)	89.22 (31.98)	83.95 (27.47)	91.488 (35.66)
Pre-manipulation plank self-efficacy	62.29 (23.64)	67.47 (20.26)	59.47 (26.03)	63.08 (23.50)
Post-manipulation plank self-efficacy	59.88 (19.23)	56.41 (20.92)	52.82 (24.72)	56.37 (21.72)
Pre-manipulation plank two self- efficacy	48.71 (20.13)	50.82 (16.42)	47.06 (19.62)	48.86 (18.67)
Post-manipulation plank two self- efficacy	57.71 (18.72)	49.70 (17.71)	47.47 (19.24)	51.63 (18.91)

Abdominal plank performance. H1 was tested using an ANCOVA, with the initial plank time as the covariate and the time on the second plank as the dependent variable. Assumptions of the ANCOVA (e.g. normality, linearity, homogeneity of variance) were checked and results were found to be acceptable (Tabachnick & Fidell, 2007). The covariate effect was significant [ $F(1, 98) = 234.64, p < .001$ ], so it was retained in the model. The group effect was significant [ $F(2, 98) = 7.66, p < .001, \eta^2_p = .14$ ] indicating a large effect size (Cohen, 1969). After controlling for plank hold one times, the positive norm group (estimated marginal M=101.59 sec, 95% CI [95.04, 108.13]) held their plank significantly longer than the negative norm group (estimated marginal M=83.79 sec, 95% CI [77.21, 90.38]) and the control group (estimated marginal M=89.08 sec, 95% CI [82.50, 95.66]). The negative norm group and the control group did not differ significantly.

Self-efficacy. H2 was tested using two RMANOVAs. In the first analysis, changes in self-efficacy for the second plank were examined to determine whether the provision of normative information affected perceptions of efficacy. The 3 (group) by 2 (pre-post efficacy for the second plank) revealed a significant group by time interaction [ $F(2, 99) = 10.22, p < .001, \eta^2_p = .17$ ] indicating a large effect size (Cohen, 1969). The interaction is illustrated in figure 3.1

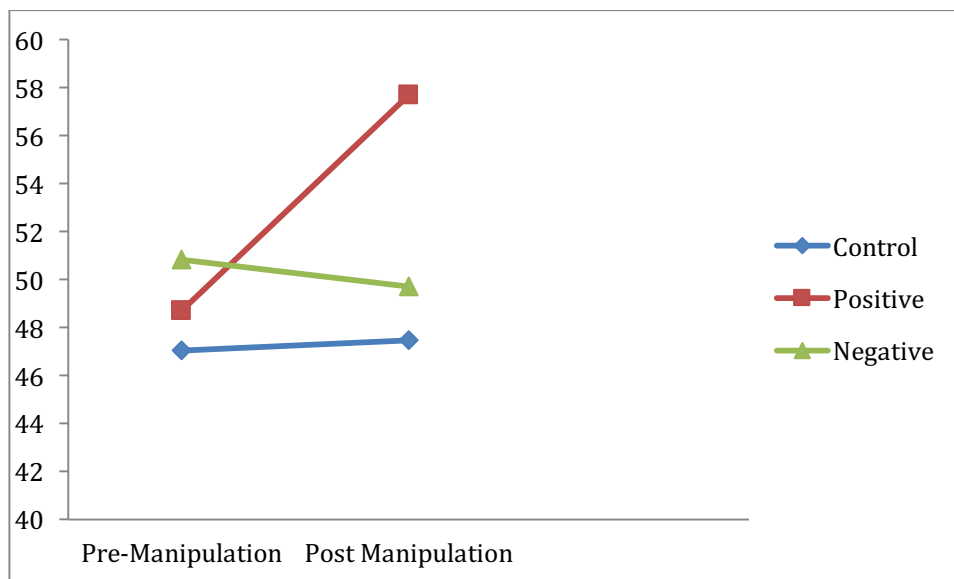


Figure 3.1. Changes in plank 2 efficacy

The group by time interaction indicates that the presentation of positive normative information about peers' performance on the second plank produced an increase in self-efficacy. Efficacy levels did not change for the control group or the negative norm group.

The second RMANOVA examined change over time from the initial efficacy to perform a plank and the final efficacy after both trials had been completed with the normative information presented during the rest period. The 3 (group) by 2 (pre-post efficacy) RMANOVA revealed a significant time effect [ $F(1, 99) = 13.80, p < .001, \eta^2_p = .12$ ]

indicating a large effect size (Cohen, 1969), but the group by time interaction was not significant [ $F(2, 99) = 1.91, p = .153, \eta^2p = .04$ ]. The trend across time is illustrated in Figure 3.2.

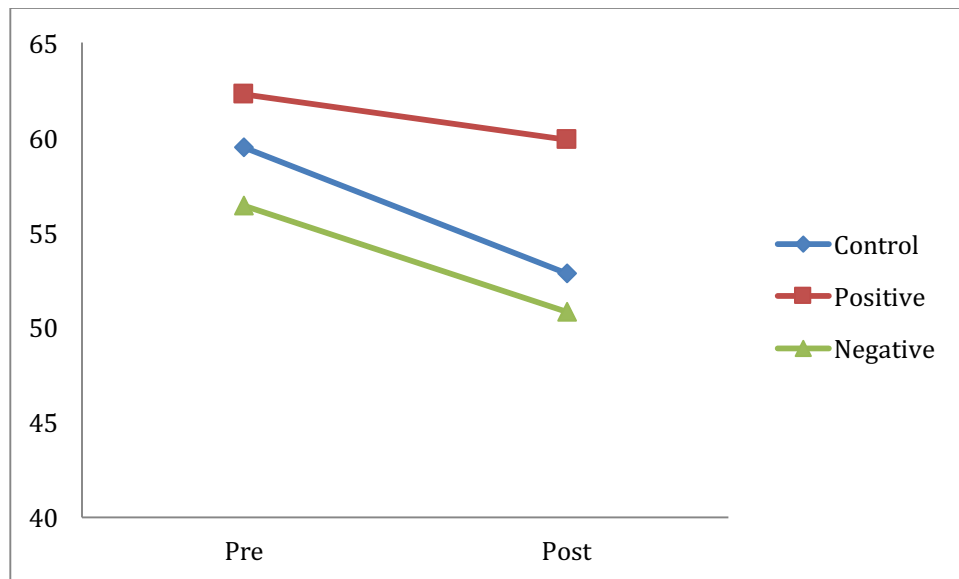


Figure 3.2. Changes in total plank efficacy

Self-efficacy to perform a plank at the level of peers the same age and sex decreased from pre to post test, but the rate of decline did not vary based on the treatment.

#### Manipulation Check

At the conclusion of the testing session, participants in the groups that received normative feedback were asked to indicate their level of agreement with statements that the information they were given about others' performance was believable, relevant, easy to understand, and persuasive. The responses on a scale of 1 (strongly disagree) to 7 (strongly agree) indicated that both the positive ( $M = 5.70, SD = .88$ ) and negative ( $M = 6.12, SD = .83$ ) norm groups found the information provided to be credible.



## Discussion

Using a muscular endurance task, the purpose of study two was two-fold: to examine the effect of positive and negative normative triggers on an individual's performance and to examine the effect of normative information on task self-efficacy. Findings support the conclusion that normative triggers affect individuals' performance on a muscular endurance task where performance is largely dependent on willingness to exert effort.

The first hypothesis of the study, that positive information would produce improved performance while negative information would produce a decrement as compared to the control condition, was partially supported. Individuals who were presented with a positive trigger (i.e. a majority of peers are able to maintain the abdominal plank position longer on the second attempt than they did on the first) outperformed those who received no normative information as well as those who were presented with a negative trigger (i.e. a majority of peers are able to maintain the abdominal plank position for less time than they held the first). These results suggest that the presence of a positive norm trigger prompts a greater level of effort in single bout of an abdominal endurance exercise than a negative trigger or no trigger. These findings mirror the results reported by Priebe and Spink (2014) who also found that individuals who received positive norm information outperformed those who received no information on the second trial of a muscular endurance task. This supports the theoretical assertion from the FTNC (Cialdini et al. 1990) that by providing a reference point for appropriate behavior in a specific situation, social norms serve as a decisional cue to exert a high level of effort on the second attempt, in light of the information that a majority of peers performed better on the second attempt. A strength of this study is that norm perceptions about performance on the second trial were measured prior to providing the normative triggers, and only a very small percentage of

participants expressed the belief that performance of their peers would improve (6%). This verifies that the positive norm information (that a majority of participants had been able to hold the plank longer on the second attempt) was not congruous with the preconceived notions the participants held and demonstrates that providing credible information can elicit increased effort and performance on a task.

A unique contribution of this study is the inclusion of negative normative information in the research design. Individuals who received information that, on the average, their peers decreased performance on the second attempt, exerted less effort and performed worse than those who received the positive information, which provides partial support for the first hypothesis. Their performance, however, did not differ from the control group who received no normative information. A possible explanation of this may be that the negative trigger basically confirmed their existing perception (i.e. the norm perceptions the control group already held) so the negative information did not have a significant effect.

One potential explanation for the effect of a normative trigger on the performance of the second plank attempt is that the norm trigger operated by affecting the individual's self-efficacy which then in turn affected their performance. The second hypothesis tested was related to task self-efficacy. As in the first hypothesis, it was theorized that the positive trigger would increase task self-efficacy and the negative trigger would decrease self-efficacy as compared to the control condition. Consistent with the findings relevant to the first hypothesis, the results provide partial support for the predictions. The positive norm trigger produced an increase in self-efficacy for the second attempt, while the task self-efficacy levels for the individuals who received negative normative information and no normative information remained constant. It was expected that the negative information would decrease self-efficacy, but again, it seems that the

negative trigger essentially confirmed existing expectations so participants reacted in a similar way to the group that received no information.

These findings suggest that information on the ability of similar peers can affect an individual's perception of their own ability and ultimately the level of performance on a task. The increase in task self-efficacy associated with the provision of positive information is consistent with Priebe and Spink (2014) who reported similar findings. A likely mechanism for the effect of positive norms on efficacy is found in the concept of vicarious experience, one of four sources of self-efficacy (Bandura, 1977). That is, if the participant believes a peer of similar ability performed a task at a given level, then they believe they too can perform a task at that level. Lu et al. (2014) identified self-efficacy as a mediator in the relationship between peer norms and levels of PA, and the findings from this study add support for the assertion that self-efficacy is an important mechanism through which norms affect behavior.

Another point of interest regarding self-efficacy was whether overall task efficacy would be affected by the presentation of normative information. The general measure of task self-efficacy assessed efficacy beliefs about the ability to hold a plank relative to the average performance of peers of the same age and sex, in contrast to the self-referent ability relative to holding the second plank. There was a general decline in overall task self-efficacy across all groups, but the decrease was similar across groups. The provision of a positive normative trigger, although powerful enough to increase efficacy for the second attempt, did not affect overall efficacy. One explanation for this can be found in the reference point for the efficacy level (other vs. self). It is also important to point out that efficacy beliefs are very specific, so a positive trigger about relative performance on a second attempt may not be viewed as applicable to the overall ability to perform the task. It should also be noted that individuals received no

feedback concerning their performance, so there was no information relative to mastery performance, the most influential source of information for self-efficacy.

Several implications are supported by the results of this study. It is clear that providing a positive norm trigger that communicates high expectations can increase self-efficacy and facilitate a willingness to exert effort that can lead to improved performance. So, practitioners in PA settings would be well advised to ensure that program participants are provided with triggers that facilitate the belief that they can meet a high but realistic expectation. Additionally, the results reinforce the notion that self-efficacy is a very specific construct and that information that is effective in increasing efficacy for a specific task (i.e. the second abdominal plank) may not extend to a more global self-efficacy belief (ability to perform the plank relative to peers). When the goal of a normative trigger is to bolster self-efficacy, it is seemingly important to make sure that the information provided extends to the broader context of performing a behavior.

Although the results of this study are promising, some questions remain unanswered and further study is warranted. First, the negative information provided in the study seemingly confirmed the normative beliefs that participants already held, but they did not lower the expectation, which was the intent. To more clearly understand the effect of negative normative information, it would be important to design a study where the negative information is lower than the conceptions that are already held. There is evidence that normative triggers can result in unintended consequences (Cialdini et al. 2006), and one goal of this study was to examine the effect of negative normative information as a first step in investigating the consequences of the proliferation of information provided to the general population that the social norm is to be physically inactive. The results of this study suggest that confirming low expectations can result

in decreasing effort and maintaining a low level of self-efficacy, but this issue needs further study.

Understanding the mechanisms through which social norms affect behavior is an important research avenue. The results of this study, consistent with the work of Lu et al. (2014) suggest that, as the investigation of these mechanisms moves forward, it is important to explore the role self-efficacy plays in the process through which norms affect behavior.

## CHAPTER 4: GENERAL DISCUSSION

Currently less than half of US adults regularly engage in the 150 minutes of recommended PA a week. This is despite the fact that the benefits of PA are well documented and well publicized. The investigation of ways to promote PA is an important endeavor, in that increasing PA can increase life expectancy, improve health-related quality of life, especially for older adults, and also produce economic benefit by decreasing health care costs attributed to chronic diseases that are associated with high levels of physical inactivity. Social norms provide a framework for exploring ways and developing strategies for structuring an environment to increase PA. The primary purpose of this dissertation was to explore the relationship between norms and PA. That was accomplished in two ways. First the underlying cognitive mechanism of norms and behavior were explored to gain a deeper understanding of how social norms affect behavior. Second, an experiment was conducted to test the effect of normative information on performance and self-efficacy in a muscular endurance task.

While initial evidence of the influence of norms is well documented, understanding the underlying mechanism of this process is crucial to creating effective normative intervention strategies. Using the TNSB (Rimal & Real, 2005) as a framework, the major purpose of the first study was to examine the mechanism through which descriptive norms affect intentions to be physically active. The TNSB asserts that the direct relationship between descriptive norms and behavioral intentions is moderated by other variables. Rimal and Real (2005) identified three cognitive processes; injunctive norms, group identity, and outcome expectations, as significant moderators in the relationship between descriptive norms and intention and those variables were included in this study. Based on the work of Yun and Silk (2011), self-identity was also examined as a possible influence. Results of this study indicated injunctive norms, outcome

expectation, and group identity partially mediated the relationship between norms and PA intention and self-identity fully mediated this relationship. While TNSB has not previously been applied to norms and PA, findings from this study on the partial mediating effect of injunctive norms and outcome expectation were consistent with earlier work (Rimal, 2008). Prior to this study the mediating role of self-identity between descriptive norms and PA intention had not been explored, and the finding that exercise self-identity fully mediated this relationship is an important contribution to the literature.

The second study was guided by tenets of the FTNC framework, which posits that while social norms surround us, it is not until they are focused on or made “more salient” that they influence behavior (Cialdini et al., 1990). Therefore the statements we make regarding the PA habits of the majority may have positive or negative consequences depending on how they are phrased. Results of this study reinforced this assertion. Individuals completed two trials of a muscular endurance task and were provided positive, negative, or no information concerning performance expectations on the second attempt during a rest period. The length of time that the abdominal plank was held on the second trial decreased for all groups, which was expected and attributed to fatigue from performing multiple attempts at maximal effort. Individuals who received a positive norm message outperformed the other groups, however, on the second trial when the performance on the first trial was controlled for. These findings are consistent with the tenets of FTNC and with the previous study by Priebe and Spink (2014). Additionally, participants who were given information that their peers held the second plank longer had increased task self-efficacy for the second attempt as compared to the other groups. These findings on the effect of positive normative information on self-efficacy were also consistent with Priebe and Spink (2014). Prior to this study the effect of “anti-exercise” norms on self-

efficacy had not previously been examined. The group receiving negative information performed similarly to the group that received no information, so inferences about the effect of negative information are difficult to make. I surmise that the negative information provided to the participants in that group simply confirmed the expectations that they already held, so there was no effect attributed to that information.

From a practical perspective the findings of this dissertation have a number of implications for health care practitioners, coaches, and physical education teachers. First teachers, coaches, and practitioners should strive to create an environment that highlights information about positive PA and exercise behaviors that are participated in by a majority and avoid highlighting information about high levels of inactivity. An example of this for teachers is to put up signs and pictures of students participating in PA. For health care practitioners, an example of this is leading health initiatives with information that a majority of people in their communities or communities that are similar to theirs have increased their PA levels in the last year rather than pointing out that the majority of the members of the community do not achieve the recommended weekly amount of PA. For coaches this could be used in practice to motivate athletes to put forth more effort in a given situation. For example, if a basketball coach were to point out to athletes that other teams in their district are increasing the number of practice shots by five percent every practice, this information could potentially motivate players to take more practice shots.

Additionally, health care practitioners, coaches, and physical education teachers should focus on creating a climate that fosters high levels of exercise self-identity. Practitioners and teachers need to be aware that how individuals view themselves is related to how they perceive



their peers, how they perceive the consequences of being physically active, and whether or not they intend to participate in PA in the future.

Based on the results of these studies, there is reason to believe that continued investigation of the relationship between social norms and PA is warranted. Findings from the first study suggest that a clearer understanding of self-identity and how it relates to norms and behavior could be productive. Although the second study provides some initial evidence, there is also a need to further explore the effect of information that communicates a negative normative perception. Both studies support further investigation of the role that self-efficacy plays in the relationship between descriptive norms and behavioral intentions.

In conclusion, this dissertation provided significant insight into the relationship between social norms and PA. The findings highlight that in addition to the use of positive PA norms to increase PA and exercise behavior, it is crucial that health care practitioners, coaches, and physical education teachers focus on fostering a high level of exercise self-identity, and avoid emphasizing that the majority of individuals do not engage in a positive behavior such as being physically active.

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## APPENDIX A: EXTENDED REVIEW OF LITERATURE

### Exploring Social Norms as a Framework to Understand Decisions to be Physically Active

The benefits of a physically active lifestyle have been well documented. Engaging in regular physical activity (PA) decreases an individual's risk for cardiovascular disease, diabetes, and certain kinds of cancer. Additionally, individuals who are active receive positive mental health benefits and report a higher quality of life, especially as they age. Even though the benefits of being physically active are evident, Americans in general are not as active as they should be. Additionally, PA levels decrease with age, and currently less than 50% of American adults meet the recommended 150 minutes of PA per week (Center for Disease Control [CDC], 2009). In light of the concerns related to physical inactivity, it is important to find ways to structure environments to promote PA.

Social norms provide a framework for exploring factors that influence decisions to be physically active (Ajzen, 1985; Ajzen, 1991). Interest in social norms gained traction as the Theories of Reasoned Action (TRA) and Planned Behavior (TPB) were applied as frameworks to understand behavior change. Subjective norms are an important component in those approaches, but much of the research exploring norms within the frameworks of TRA and TPB suggested that norms were less influential moderators of behavioral intention than behavioral beliefs or control beliefs (Plotnikoff, Lippke, Courneya, Birkett, & Sigal, 2010). More recent research, however, has demonstrated that norms constitute a very complex construct that may have a more significant role than originally recognized (Cialdini, et al., 2006; Smith-McLallen & Fishbein, 2008). Newer models stemming from the TPB that incorporate a more sophisticated

conceptualization of social norms reveal norms account for a higher percentage of the variance in behavioral intention than previously thought (Smith-McLallen & Fishbein, 2008).

The Focus Theory of Normative Conduct (FTNC) has been used to explore the role of social norms in promoting positive health behaviors (Burger & Shelton, 2011). It is logical to extend the use of social norms to guide research about promoting PA, but to date there has been little investigation of how social norms affect PA behavior. The purpose of this review of literature is to examine characteristics of social norms and the extent to which norms influence behavioral intention and behavior outcomes in PA. The first section examines the theoretical basis for the study of social norms. Findings from existing research are synthesized in the second major section. I conclude with a summary of current research and implications for practice, as well as directions for future research.

## THEORETICAL FRAMEWORK

The development of the theoretical basis for the investigation of social norms is grounded in the evolution of several frameworks. Initially, social norms were defined and explored within larger theories such as TRA and TPB (Ajzen, 1991; Fishbein & Ajzen, 1975). Using both the TRA and TPB, subjective norms have been explored in a diverse array of settings, and that is described in the first part of this section. Next, the FTNC (Cialdini, Reno, & Kallgren, 1990), which evolved from the TPB is described. FTNC extends the conception of subjective norms by delineating norms along two dimensions. The first dimension differentiates norms as either descriptive or injunctive. Injunctive norms incorporate a level of evaluation, while descriptive norms do not. The second dimension characterizes the referent group of the norming factor as either proximal or distal (Borsari & Carey, 2003). These dimensions produce four types of norms: descriptive proximal, descriptive distal, injunctive proximal and injunctive distal.



Following this, the Theory of Normative Social Behavior (TNSB), which evolved from the FTNC, is explored (Rimal & Real, 2005). The TNSB framework model illustrates the influence of three normative mechanisms (injunctive norms, outcome expectations, and group identity) as moderators between descriptive norms and behaviors (Rimal, 2008). The section on the theoretical basis concludes with a description of the social norms approach (Berkowitz (2005), which is a framework for understanding how behavior can be influenced by individuals' misperceptions of how their social groups think and act.

### Theory of Planned Behavior

The TPB provides a framework for predicting and understanding behavior and barriers to behavior. It theorizes that attitude towards behavior, perceived behavioral control and subjective norms affect behavioral intention and ultimately behavior (Ajzen, 1985; Ajzen, 1991). Within the TPB, attitude towards a behavior is characterized as a combination of the perceived consequences of performing the behavior and the expected outcome of performing that behavior (Ajzen, 1991), focusing on the questions “Is the behavior beneficial?” and “Is the behavior enjoyable?” Subjective norms are the product of perceived expectations of others and the level of desire to comply with the perceived expectations, revolving around the questions “Do significant others think I should do that” and, “Do I value what significant others think?” Perceived behavioral control is the third component of TPB, defined as the degree to which a person feels he or she has control of carrying out a behavior, reflected in the question “To what degree do I feel I can control the outcome of a behavior?”

The TPB model is used to predict behavior largely by understanding the underlying beliefs about a behavior (Smith-McLallen & Fishbein, 2008). The three constructs on the far left of the model presented in Figure 1, behavioral beliefs (i.e. attitude), normative beliefs (i.e.

subjective norms), and control beliefs (i.e. perceived behavioral control), directly influence an individual's behavioral intention. Behavioral intention then directly influences an individual's behavior. Control beliefs are also conceptualized as having a direct effect on behavior (Ajzen, 1991).

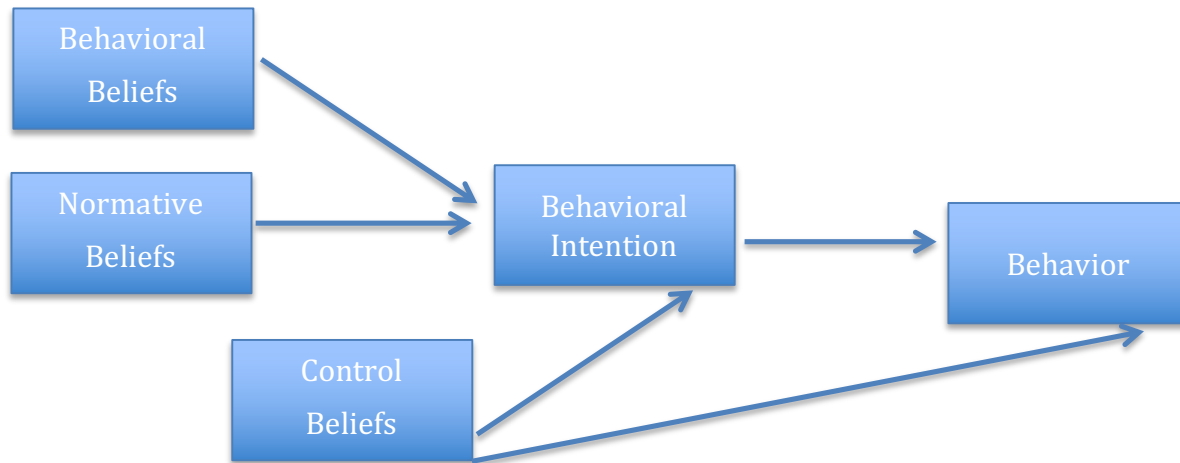


Figure 1. (Ajzen, 1991)

Components within the TPB are typically measured with questionnaires that are developed based on recommendations from Ajzen (2006). Ajzen recommends that a behavior being measured within TPB questionnaires should encompass four aspects; a target, an action, a context, and a time. An example activity is biking on a stationary bike at the gym for at least 20 minutes each day for the next month. The action in this example is biking, the target is the stationary bike, the time is 20 minutes, and the context is the gym. Ajzen recommends the use of Likert scaling or Thurstone scaling as response scales. Scales addressing each of the four predictor variables (behavioral intention, perceived behavioral control, subjective norms, and attitude) can be adapted from any of the multiple valid and reliable scales that have been created.

The numbers of items vary by scale. One example of a valid and reliable TPB questionnaire created by Wing-Kwan, Bray, and Martin-Ginis (2009) consists 16 items (5 items for attitude, 4 items for subjective norms, 5 items for perceived behavioral control, and 2 questions for intention) on a 7-point Likert scale ranging from strongly disagree to strongly agree.

Of the three constructs identified in the model as influencing an individual's behavioral intention, perceived behavioral control has the strongest influence on intention. Attitude consistently is the second strongest influence on behavioral intention in the model, and subjective norms exert the weakest influence. Behavioral intention and perceived behavioral control both directly influence behavior but behavioral intention consistently has a stronger degree of influence on behavior (Galea & Bray, 2006; Hunt & Gross, 2009). These findings have been observed across many settings. In the health and PA setting the TPB framework has been used extensively in the context of health and PA to guide attempts to better understand individuals' PA behavior. (Galea & Bray, 2006; Hunt & Gross, 2009; Lee, 2011). Findings in PA settings are consistent with previous TPB findings that indicate intention to be physically active is most strongly influenced by perceived behavioral control, followed by attitude and with subjective norms making a comparatively smaller contribution. Also, PA participation is more strongly and directly influenced by intention than other constructs in the TPB model

As TPB gained traction the concept of subjective norms grew as an area of interest. While the influence of subjective norms was consistently found to be weaker than the other constructs of the model, subjective norms were significant predictors of intention and, therefore continued to warrant inclusion in the model (Fishbein, 2000).

### Focus Theory of Normative Conduct

The exploration into subjective norms was one of many avenues researchers used in attempts to gain a better conceptual understanding of social norms (Ajzen, 1991; Shaffer, 1983). There was, however, a lack of consistency in the way researchers defined and conceptualized social norms (Shaffer, 1983). Factors such as social consequence for example, were considered an important facet within some theories conceptualizing norms such as the FTNC, but not even addressed in other theories such as TPB (Ajzen, 1991; Bandura, 1977). This lack of consistency in conceptual definitions of norms was cited as being partially responsible for the lack of consistency in findings related to the efficacy of norms as a tool for behavior change (Rimal, 2008; Shaffer, 1983). In an effort to address this issue and to guide research on social norms, Cialdini et al. (1990) formulated the FTNC. Drawing on aspects of social norms evident in existing frameworks such as subjective norms characterized in the TPB, they developed an overarching framework that could be applied to social norms research. As illustrated in Figure 2, FTNC focuses solely on social norms and their influence on intention and behavior, as opposed to other theoretical frameworks that use norms as one construct within a cohort of social constructs influencing behavior simultaneously (Ajzen, 1991; Cialdini, et al., 1990).

The FTNC framework delineates norms into two distinct categories: injunctive and descriptive (Cialdini et al., 1990). Injunctive and descriptive norms are unique constructs both from a theoretical standpoint as well as in mechanisms through which they affect behavior (Rimal & Real, 2005). Injunctive and descriptive norms are constantly surrounding individuals but they do not influence individuals' behavior until activated by "triggers." A trigger is something an individual sees or hears that causes the individual to become increasingly aware of the norms in their environment. Triggers activate both injunctive and descriptive norms, and the

more salient or powerful the trigger is the more likely the norm being triggered will influence a behavior (Cialdini et al., 1990).

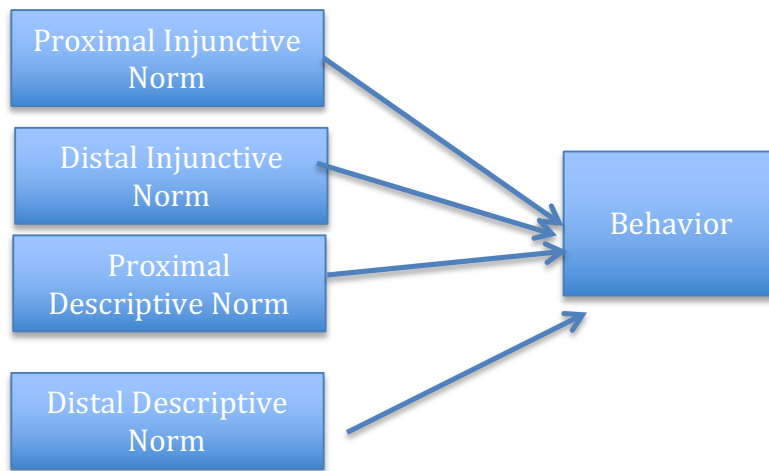


Figure 2. (Cho, 2006; Cialdini et al., 1990)

Injunctive norms are defined as the perception of the approval or disapproval of important other individuals (i.e. my friends think it is great that I go to the gym regularly). Within this framework injunctive norms operate under the assumption that individuals seek affiliation with the group they perceive approves of the behavior (Jacobson, Mortensen, & Cialdini, 2011). Mollen, Rimal, Ruiter, Jang, and Kok (2013) state with regard to defining the mechanism of change for injunctive norms, “The underlying idea here is, if we do what others approve of they must approve of us, too (p. 563).” Social consequences, either positive or negative, are an inherent byproduct of choosing to either conform or not conform to the behavior of the group. The perception of injunctive norms can influence efforts to conform to norms with the goal of either gaining approval or avoiding disapproval. This aspect of social consequence is worth noting because it is what conceptually distinguishes norms within FTNC from subjective

norms characterized in the TPB. While both concepts are based on the approval of others, subjective norms do not take social consequence into account (Rimal & Real, 2005).

The second type of norm delineated in the FTNC is descriptive norms. A descriptive norm is defined as what an individual perceives others around them are commonly doing (Cialdini et al., 1990). In unfamiliar situations descriptive norms can drive behavior change by providing the individual a reference point for what is socially acceptable in particular situation, serving as sort of a shortcut to defining what is appropriate. The individual observes what others around them are doing, and then mimics their behavior because they believe that if everyone around them is participating in a behavior, it must be what is socially acceptable in that situation. An example of this is when an individual visits a church they have not attended and they stand up during worship activities such as hymns when they see the rest of the congregation standing to sing (Mollen, Ruiter, & Kok, 2010).

Descriptive norms function through the mechanism that individuals believe if they copy the behavior of a group of peers, then a similar outcome will result (Rimal, 2008). An example of this is found in research on norms relative to alcohol consumption in college students. Specifically, students witnessing their peers drinking and having fun may conclude that if they drink then they, too, will experience the same enjoyment they perceive their peers are experiencing (Rimal & Real, 2005).

While injunctive and descriptive norms operate through differing mechanisms to influence behavior, activation of either type of norm is dependent on the presence of a trigger (Cialdini et al., 1990). Triggers function as a catalyst, initially prompting individuals to focus on their peers' feelings towards a behavior or their peers' level participation in a behavior (Robinson, Fleming, & Higgs, 2014). Injunctive norm triggers focus the individual on what

behavior their peers approve or disapprove of while descriptive norm triggers focus the individual on what the behavior their peers are or are not doing (Cialdini et al., 1990). An example of an injunctive norm trigger in an intervention study seeking to increase the consumption of vegetables in high school students came in the form of a sign that read, “A lot of people aren’t aware that the typical student thinks their peers should eat five servings of fruits and vegetables each day. Students think you should eat more fruit and vegetables than you’d expect” (Robinson et al., 2014, p. 1060.) This sign highlighted what students felt their peers should do, thereby specifically targeting the injunctive norm perceptions. An example of a descriptive norm trigger in this study is “A lot of people aren’t aware that the typical student eats their five servings of fruits and vegetables each day. Students eat more fruit and vegetables than you’d expect” (Robinson et al., 2014, p. 1060). This sign highlighted the quantity of peer vegetable consumption (descriptive), but does not include an expression of approval or disapproval.

In their meta-analysis of studies investigating self-other discrepancies related to descriptive and injunctive norms in college drinking, Borsari and Carey (2003) found support for the assertion that injunctive and descriptive norms are unique constructs. Additionally they concluded that the proximity of the referent group to the individual was an important factor that should be considered in the assessment of norms in order to maximize the effectiveness of interventions designed to trigger social norms to facilitate behavior change. As research on social norms progressed, the referent group for injunctive and descriptive norms has been included, classified as either proximal or distal. Proximal refers to an individual’s close friend group (i.e. my few friends I spend most of my time with). In contrast, distal refers to a larger population (i.e. Americans). Incorporating both dimensions produces four types of norms:

proximal injunctive, distal injunctive, proximal descriptive and distal descriptive. Generally proximal and distal norms are positively associated but they are distinct constructs (Cho, 2006; Randazzo & Solomon, 2015; Yun & Silk (2011). Questionnaires are used to measure the perception of injunctive and descriptive norms as well as norms proximal and distal dimensions (Park & Smith, 2007). The four types of social norms are generally assessed using a 7-point Likert scale (1=strongly disagree; 7=strongly agree) with three questions targeting each norm type. Sample items for each norm are: a) proximal injunctive: my close friends think it is important to exercise; b) distal injunctive: students at my university think it is great to exercise; c) proximal descriptive norms: my close friends exercise frequently; and d) distal descriptive norms: students at my university exercise frequently.

#### Theory of Normative Social Behavior

The TNSB emanated from a call for further research into the injunctive and descriptive norms conceptualized in FTNC. Rimal and Real (2005) developed the TNSB in an attempt to better explain the underlying mechanisms that moderate the relationship between descriptive norms and behavioral intention. Prior to the formulation of the TNSB in 2005, researchers using the FTNC sought to establish that injunctive and descriptive norms exert statistically significant influences on behavior that were distinct from one another with regard to both attributes and mechanisms of change (Rimal & Real, 2005). This was established in several studies using interventions to create injunctive and descriptive norms. Significant effects were observed both in studies seeking to increase a desired behavior such as choosing to eat more healthy foods, and in studies seeking to decrease an undesired behavior such as binge drinking (Cialdini et al., 1990; Jacobson, Mortensen, & Cialdini, 2011; Mollen, Rimal, Ruiter, & Kok, 2013).



The TNSB asserts that descriptive norms have a direct influence on behavioral intention that is moderated by three factors: injunctive norms, outcome expectations and group identity. The focus of the TNSB is on these three factors that moderate the relationship between descriptive norms and behavior, referred to as “normative mechanisms” (Rimal & Real, 2005; Rimal, 2008). The TNSB is illustrated in Figure 3.

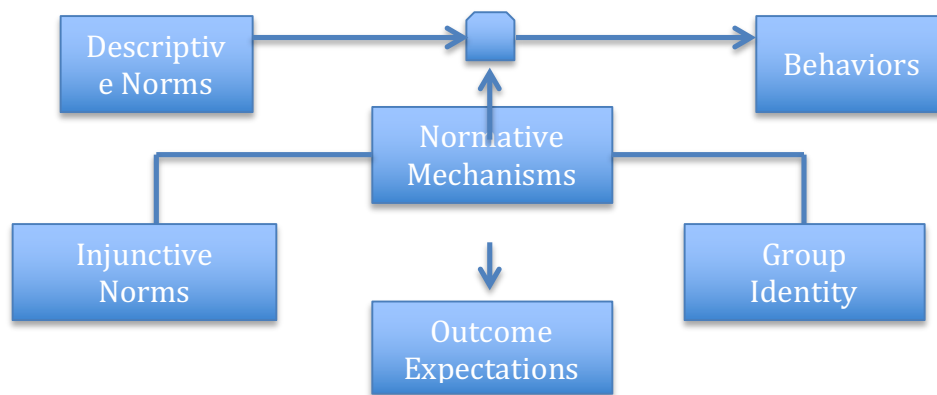


Figure 3. (Rimal & Real, 2005)

Definitions and measures of descriptive and injunctive norms are consistent across TNSB and FTNC (Cialdini et al., 1990; Rimal & Real, 2005). The distinction is that, rather than being an independent influence on behavior, injunctive norms are conceptualized in TNSB as a moderating variable between descriptive norms and behavior. So, in this model, descriptive norms affect injunctive norms.

Outcome expectations are also identified as a normative mechanism between descriptive norms and behavior. Outcome expectations are operationalized in three subgroups: benefits to self, benefits to others, and anticipatory socialization (Rimal & Real, 2005). Benefits to one's self in this model are grounded in concepts from Bandura's (1977) social cognitive theory and are defined as “beliefs that his or her actions will lead to benefits” (Rimal & Real, 2005, p. 393). For example, a students' belief that drinking alcohol will make them appear cooler, more

relaxed, enable them to act more boldly, and ultimately be accepted by their peers is an outcome expectation that is beneficial to self (Rimal, 2008). The second type of outcome expectation, benefits to others, is evident when an individual perceives a peer is attaining a positive outcome by participating in a given activity (Rimal, 2008; Rimal & Real, 2005). An example of this is when college students believe that their peers appear cooler and more relaxed when drinking alcohol (Rimal & Real, 2005). Through the lens of TNSC, the driving force behind this is that the individual fears s/he will miss out on the benefits others appear to be receiving if they do not participate in the same activity (Mollen, Rimal, Ruiter, Jang, & Kok, 2013). This fear of missing out is what motivates the individual to participate.

Anticipatory socialization, the third type of outcome expectation, is the outcome expectation that a behavior will serve as a social lubricant. Social lubricants are regarded as behaviors that help ease an individual's transition into an unfamiliar social setting (Rimal & Real, 2005). When a new college student drinks alcohol as a way to more easily make friends and create bonds, alcohol is being used as a social lubricant. When a student's motive for drinking is that he/she believes drinking will smooth or ease the process of creating making friends (Rimal & Mollen, 2013), the individual has an outcome expectation related to anticipatory socialization.

The third normative mechanism delineated in the TNSB model is group identity. Group identity is defined as "individuals' aspirations to emulate referent others and the extent to which they perceive similarity between themselves and those referents" (Rimal & Real, 2005, p. 395). Within the TNSB model, group identity consists of two facets, similarity and aspiration. Similarity refers to an individual's perception that a given group of people resemble themselves (Rimal & Real, 2005). The underlying mechanism is that, as the individual's feelings of identity

with a group increase, the desire to conform to group behavior increases to maintain their position in the group (Rimal, 2008). Aspiration addresses the motive of the individual to conform to a social referent group they desire to be a part of, but one in which they have not yet been accepted. Also referred to as modeling, individuals believe that dressing and acting like the group they aspire to be a part of will aid in their pursuit to be accepted as part of this group. This is evident in a research study that examined students' drinking habits and their relationship with aspirations to join the Greek system. Incoming college students who aspired to join the Greek system reported a higher intention to drink alcohol and perceived higher levels of alcohol consumption among current Greek students than those who were not pursuing Greek affiliations (Rimal & Mollen, 2013).

Rimal (2008) reassessed the utility of TNSB as a model for predicting behavioral intention to drink alcohol. His results supported the use of TNSB as significant predictor of behavioral intention and provided evidence that normative mechanisms (injunctive norms, outcome expectations and group identity) significantly moderated the relationship between descriptive norms and intention to drink alcohol. Additionally, Rimal explored possible modifications to TNSB by examining injunctive norms and outcome expectations as mediators in the relationship between descriptive norms and behavior intentions. He found they partially mediated the relationship but concluded that these findings were not sufficient to warrant modifications to the TNSB model (Rimal, 2008).

Researchers using TNSB as a framework typically measure the construct variables using Likert scale questionnaires. Questionnaires employed in TNSB research are a collection of established measures. For example, injunctive and descriptive norms may be measured using the Park and Smith (2007) questionnaire, while the behavioral identity section of the questionnaire is

adapted from the Conner, Warren, Close, and Sparks (1999) behavioral identity questionnaire. TNSB questionnaires vary with regard to assessment tools used but typically constructs within TNSB (descriptive norms, behavioral intention, injunctive norms, outcome expectations and group identity) are measured individually.

### Social Norms Approach

Across a number of studies of social norms, it was evident that the accuracy of perceived norms was an issue that needed to be considered. The social norms approach (SNA, Berkowitz, 2004) asserts that the influence of social norms is based more on the *perceived* norm (what individuals think about what their peers think and do) than on the *actual* norm (what their peers really think and do). The basis for the social norms approach is this misperception reflected by the discrepancy between perception and reality. Perkins (1997) described the situation when a norm is misperceived as a byproduct of the highly visible behavior of a small group that is remembered more vividly than the less visible behavior characteristic of the majority. Perkins and Berkowitz (1986) observed the phenomena of misperceived norms in their seminal research into college students' perceptions of their peers' volume and frequency of alcohol consumption, identifying a pattern of inflated estimates of peer alcohol consumption. This led to a series of studies on normative misperceptions (Perkins, 1996; Perkins, 2002; Perkins & Wechsler, 1996) forming the basis of the SNA (Berkowitz, 2005).

Berkowitz (2005) outlines seven assumptions regarding normative misperceptions in the SNA framework. These assumptions affirm the existence of normative misperceptions, provide a description of the possible consequences of these misperceptions, and also provide a guiding framework for designing interventions to correct misperceptions (Berkowitz, 2010). These seven assumptions with examples are listed below:

1. Actions are often based on inaccurate information or on a misperception of peers' behaviors and attitudes towards behaviors. An example of this is found in investigations of alcohol consumption where college students often perceive drinking to be more prevalent than it actually is (Stock et al., 2014). That misperception can lead to an increase in drinking.

2. When inaccurate perceptions of norms, even though they are misperceptions, are perceived as real, they lead to real consequences. Extending the example in the first assumption, the increased alcohol consumption precipitated by the misperception will produce real consequences associated with at risk drinking.

3. Individuals tend to passively accept misperceptions rather than acting to change them. Evidence of this is found in research on hazing. The majority of individuals in a group may actually disapprove of hazing, but individuals inaccurately assume the majority approve of it. Although they may not engage in the behavior, they stand by and allow it to continue (Waldron, 2012).

4. Misperceptions are self-perpetuating, in that actions or expressions believed to be inconsistent with the normative misperceptions are discouraged but problem behaviors that are inaccurately perceived to be the norm are encouraged (Berkowitz, 2005). For example, there is consistent evidence that college students overestimate rates of their peers' alcohol consumption, but perceptions of high levels of peer alcohol predict alcohol consumption and binge drinking (Stock, et al., 2014).

5. Providing accurate information about a norm encourages individuals to embrace healthier behaviors that are consistent with a positive norm and to decrease problem behaviors that are inconsistent with the norm (Berkowitz, 2005). For example, when

students who binge drink regularly are given information that indicates their behavior and attitude are more in the minority than they had previously assumed, the prevalence of binge drinking often decreases (Perkins & Craig, 2002).

6. Individuals who have a misperception about a behavior but who do not participate in that behavior can still contribute to the climate that fosters the problematic behavior by the way they discuss the behavior with others (Berkowitz, 2005). For instance individuals who disapprove of hazing may not feel comfortable speaking out against it because they believe their opinions are in the minority. Even though they do not engage in the behavior, by failing to speak out against it, they may provide some indication of approval (Allan & Madden, 2012).

7. A norm does not have to be believed by the majority to influence behavior, but rather the majority simply has to believe the majority believes it (Berkowitz, 2005). That is, student athletes often grossly overestimate the frequency of drug use among peers. Despite the fact that only a very small percentage of student athletes actual report using drugs, the misperception of the high prevalence of drug use still influences decisions on drug use (LaBrie et al. 2009).

Berkowitz (2004) delineated three categories of normative misperceptions: pluralistic ignorance, false consensus, and false uniqueness. These are characterized by the referent group identified by the behavior or attitude the individual holds and the behavior or attitude the individual perceives the majority of their peers hold. **Pluralistic ignorance** is manifest in situations where an individual believes a majority of his/ her peers think or act differently than themselves when in reality, their peers' attitudes and behaviors in that situation are similar to their own (Berkowitz, 2004). For example, a student who abstains from smoking may assume

his/her peers smoke more than they actually do (Esley et al., 2015). Pluralistic ignorance results in feelings of isolation and loneliness and may lead individuals to either withdraw from their peers or to change their behavior to more closely align with the behavior they perceive as the norm (Esley, et al., 2015; LaBrie et al., 2009)

False consensus is observed in situations when an individual perceives that his/her actions or attitudes are similar to that of their peers, when in reality they are not (Berkowitz, 2004). For example, individuals who smoke may assume their peers also smoke frequently or individuals who engage in or promote hazing assume may believe their peers also participate in hazing (Allan & Madden, 2012; Esley, et al., 2015;). The misperception that most peers also participate in an unhealthy or undesirable behavior can be a subconscious way for individuals to justify their behavior (Lewis et al., 2011). For this reason false consensus is often referred to as a self-serving bias (Berkowitz, 2004). Individuals who operate under a false consensus are often found to have the strongest and most out-spoken views in their community on that given topic (Toch & Kolfas, 1984). Binge drinkers for example, are typically found to strongly approve of binge drinking and assume their peers do as well (Halim, Hasking, & Allen, 2012). The assumption that their beliefs are in the majority emboldens binge drinkers to be more vocal about their habits (Berkowitz, 2005). When false consensus and pluralistic ignorance are simultaneously present, it is likely that individuals will continue to engage in an unhealthy or undesirable behavior even though they are, in reality, in the minority while the majority of individuals who do not condone the behavior remain silent (Perkins, 1996). This resulting phenomenon is referred to as the “spiral of silence” and can lead to continued involvement in the behavior (Berkowitz, 2005).

False uniqueness is a misperception occurs when an individual believes that his/her attitude or action is less similar to his/her peers than it actually is (Berkowitz, 2005). The major difference between false uniqueness and pluralistic ignorance is that individuals who experience perceptions of false uniqueness enjoy the fact that they perceive they are different, while individuals with pluralistic ignorance do not (Suls & Wan, 1987). For example, a non-smoker who derives a feeling of self-satisfaction related to the fact that they do not smoke may overestimate the number of their peers who smoke, so they feel an increased sense of value and uniqueness in that trait. Extending that example to PA, individuals who exercise regularly may underestimate the proportion of their peers who are regularly active and develop a sense of superiority that is not warranted.

## Research Findings

### Descriptive Norms

Initial studies on descriptive norms were correlational in nature. Early evidence provided support for the notion that descriptive norms predicted behavior (Cialdini et al., 1990). For example, Rimal and Real (2005) examined the relationship between college student's personal drinking habits and their perceptions of their peers' drinking habits. They found a strong positive correlation between students' self-reported binge drinking and their perceptions of the prevalence of their peers' binge drinking. In a similar study, Cho (2006) also examined the relationship between college students' drinking habits and normative perception of their peers drinking habits, reporting that descriptive norms had a stronger influence than injunctive norms. Elek, Miller-Dale, and Hecht (2006) found a strong positive correlation between perceptions of the prevalence of peer smoking and the likelihood an individual would smoke if given the opportunity. Intention to eat a healthy diet is also predicted by descriptive norms (Yun & Silk,



2011). These studies support the conclusion that perceptions of descriptive norms are moderate to strong predictors of personal decisions about health behaviors.

Though early investigations of descriptive norms focused mainly on smoking, alcohol consumption, and food choices, more recent studies have explored the influence social norms on 21<sup>st</sup> century issues that have arisen with the increase in technology. For example, Cho, Chung, and Filippova (2015) explored the relationship between social norms and Internet piracy (i.e. illegal downloading of music, movies, etc.). Correlational analysis revealed a positive relationship between decisions to participate in Internet piracy and degree to which the individual perceives his/her peers participate in piracy.

While much of the literature on descriptive norms revolves around the relationship between these norms and undesirable behaviors, they have also been shown to correlate positively with desired behaviors. Stok, de Ridder, de Vet, and de Wit (2014) found adolescents' perceptions of peer fruit consumption and their own choices to eat fruit were positively related. Similarly, Goldstein, Cialdini, and Giskevicius (2008) reported that descriptive norms were strong predictors of energy conservation.

As researchers more closely examined the situations in which descriptive norms were more effective, a tendency for descriptive norms to be more associated with behaviors that require less conscious processing than behaviors that require more thought or planning in advance was evident. Specifically Gockeritz et al. (2010) investigated the effect of social norms on energy conservation. They found that individuals who reported they thought less about energy conservation in the weeks prior to the survey were more influenced by their descriptive norm perceptions of peer energy use than individuals who had thought about energy conservation in more depth prior to the survey.

With the relationship between descriptive norms and behavior clearly established, researchers began to conduct intervention studies by introducing triggers in field settings designed to evoke descriptive norms and it is clear from these studies that descriptive norms can spark behavior change (Stok, et al., 2014). For example, the use of a descriptive norm trigger stating “Every day more than 150 students have a tossed salad for lunch” (Mollen, Rimal, Ruiter, & Kok, 2013, p. 85), designed to influence patrons of a local food court, was effective in increasing the number of people who chose the salad bar over hamburgers. A similar study by Robinson et al. (2014) signs used as descriptive norm triggers designed to spark an increase consumption of healthy foods resulted in an increase in vegetable consumption.

Though repeated successes in using descriptive norms as a catalyst to spark short-term behavior change are documented, findings regarding the utility of descriptive norm triggers as a long-term modifier of behavior are mixed at best (Mollen, Ruiter, & Kok, 2010). In their intervention study using descriptive norms to increase fruit consumption, Stok et al. (2014) reported a continued higher rate of fruit consumption among members of the treatment group as compared to the control group two days post intervention, providing some evidence that introducing a trigger to promote a positive norm may affect behavior once the trigger, in this case a sign about consumption, is removed. In their study Schorder and Prentice (1998) introduced descriptive norms relative to alcohol consumption. Their intervention was effective in lowering perceptions of the frequency of alcohol use and decreasing intentions to consume alcohol in the treatment group as compared to a control group when the triggers were introduced. At a six-month post intervention follow-up, however, there were no differences between the intervention and control group.

Although Stok et al. (2014) provide some support for the argument that perceptions of norms may persist after the trigger used in the intervention is removed, it is important to note that the lag between the removal of the trigger and the follow-up was only two days. Evidence from the intervention studies as a whole supports the conclusion that introducing information presented as a fact (i.e. individuals consume less alcohol or eat more fruits and vegetables than you thought) can change the normative perception about a behavior over the short term, and affect behavior in the short term, even when the trigger is removed. The six-month follow-up in the Schorder and Prentice (1998) study, however, suggests that over a longer time frame the effect of the descriptive norm trigger may wash out. Presumably the perceptions of social reality (i.e. what they believe about the alcohol use of their peers) over a six-month period eradicate that effect of the descriptive norm trigger and individuals may, over time, revert to their initial norm perceptions. There is a need for further investigation into the interactions that occur in descriptive norm interventions and to explore ways to extend the effects of triggers introduced into social environments. Specifically, it is important to explore whether or not extending the length of the intervention (how long the trigger is present) affects the strength of the norm that is introduced, and alternatively, how long a trigger is effective.

### Injunctive Norms

As with descriptive norms, early investigations of injunctive norms were correlational in nature, and early evidence provided support for the idea that injunctive norms influence behavior (Cialdini et al., 1990). Amajad and Wood (2009) demonstrated this in their study of the relationship between Muslim men's perceptions of peers' attitude toward Jewish individuals and their decisions to join an extremist group. Their results showed that an individual's normative belief about his peers' attitude regarding Jewish people was a very strong predictor of whether

that individual would join an extremist group. That is, individuals who believed their peers disapproved of Jewish people as an ethnic group were more likely to indicate they would join an extremist group, while those who believe their peers approved of Jewish people were unlikely to do so. A positive relationship between injunctive norms and behavior was also reported by Yun & Silk (2011), who reported the perception that peers approve of healthy food choices was a significant predictor of college students' healthy nutritional habits.

After the relationship between injunctive norms and behaviors had been established in correlational studies, the next step was to design interventions to test the efficacy of introducing triggers in field settings to evoke injunctive norms (Rimal & Mollen, 2013). Cialdini et al. (2006) introduced injunctive norm triggers by posting signs around a national park in an attempt to deter theft of petrified wood. The signs contained messages such as "Please don't remove petrified wood from the park" (Cialdini, et al., 2006 p. 8). Injunctive norms were found to significantly decrease the rate of petrified wood theft, further affirming the effectiveness of injunctive norms as tool for behavior change. In a more recent study, Mollen, Rimal, Ruiter, and Kok (2013) designed an intervention to use norms as a tool to motivate students to intervene when peers are exhibiting unhealthy levels of alcohol consumption. The triggers used in this study were online messages indicating that most students at their university would approve of their friends intervening when they saw a friend drinking too much. Students who were exposed to injunctive norms reported a significant increase in willingness to intervene when friends are drinking an unhealthy amount of alcohol. In addition to demonstrating that introducing injunctive norms had a short term-impact on behavior, a follow-up suggested that the intervention had a continued influence on the students four weeks later.

#### Proximal vs. Distal Norms

There is considerable support for the notion that proximal norms have a stronger influence on intentions and behaviors than distal norms. In their intervention to trigger healthy food choices, Yun and Silk (2011) compared the predictive utility of four norm types (proximal descriptive, proximal injunctive, distal descriptive, and distal injunctive). Proximal norms, both descriptive and injunctive were the stronger predictors of making healthy food choices than distal norms. Similarly, Korcuska and Thombs (2003) reported that alcohol use among college students was more strongly influenced by normative perceptions of “close friends” than normative perceptions of the “typical student.” Further support for this conclusion is found in the meta-analysis conducted by Bosari and Carey (2003) of studies on norms and drinking habits. They concluded that perceptions of close peers’ drinking habits had a stronger influence on students’ decisions to drink alcohol than perceptions of campus wide norms. Additionally they found support for the conclusion that students at smaller universities are more influenced by the norms of the student body than students who attend larger universities.

### Normative Triggers

For both descriptive and injunctive norms, normative triggers play an integral role in the success or failure of an intervention targeting norms (Cialdini et al., 2006). The phrasing of a norm trigger is what identifies an intervention as descriptive or injunctive in nature. The wording of a norm trigger activates a specific norm for a specific behavior and, if worded incorrectly may lead the activation of the wrong behavior. Burger and Shelton (2011) identified the issue of improperly executed triggers as a possible cause of inconsistent findings in some norms research. An example of an unintended consequence of a poorly worded trigger is found in the study by Cialdini et al. (2006) when they introduced norms with the goal of decreasing petrified wood theft. One sign intended to decrease wood theft through the use of descriptive norms highlighted

the fact that many past visitors had removed petrified wood from the park. The goal of this trigger was to decrease the frequency of this theft. Unfortunately, instead of prompting people to not steal wood, the effect of this message (that removing wood is a problem) was to prompt people to steal wood. In areas where the descriptive norm triggers were posted, there was an increase in wood theft. Rather than decreasing the target behavior, the trigger activated the normative perception that the majority of people who visit the park are stealing wood, so stealing wood was no big deal. When injunctive norms communicating disapproval of wood theft were introduced in that study, however, wood theft decreased.

The Cialdini et al. (2006) study demonstrates that developing an understanding of how to design effective triggers is a critical element in research on social norms and in developing effective interventions. To more closely investigate the effectiveness of norm triggers, two aspects have been explored: point of reference and the valence (i.e. positive vs. negative). The point of reference refers to the context in which the trigger is situated. The point of reference for triggers can be characterized as proximal, referring to a close friend group, or distal, referring to the population as a whole (Paek & Gunther, 2007). Proximal norm triggers attempt to appeal to individuals by providing a point of reference with which they closely identify. These norms have repeatedly been found to have a more powerful influence on behavior than distal norm triggers. For example, Goldstein et al. (2008) implemented an intervention to increase water conservation at a hotel. Two different signs were placed in hotel rooms, one indicating that the guests who had stayed in this specific room (proximal) had participated in the hotel's water conservation program and the other indicating that stated guests in the hotel in general (distal) had done so. Guests in the rooms with the proximal triggers participated in the hotel water conservation program to a greater extent than individual in rooms with distal triggers.

The second aspect of norm triggers that has been studied is the valence of a trigger. A positively worded trigger is defined as a trigger expressing what an individual should do (Cialdini et al., 1990). Examples of positively worded triggers are “you should check on your friends and make sure they don’t drink and drive” (injunctive) or “the majority of people on campus recycle” (descriptive). In contrast a negatively worded message is focused on conveying to an individual what they should not do (Bosari & Carey, 2003). Examples of negatively worded triggers are “please do not feed the animals” (injunctive) or “90% of students do not drink and drive” (descriptive). In situations where researchers are attempting to increase the prevalence of a desired behavior, positive messages have been found most effective. For example the Mollen, Rimal, Ruiter, Jang, and Kok (2013) study examined the use of negative versus positive norms to increase individuals’ willingness to intervene when peers are consuming dangerous amounts of alcohol. Normative triggers were introduced to participants through online messages, followed by self-reports on willingness to intervene which were collected electronically. Results revealed positively valenced descriptive and injunctive messages were more effective at increasing behavior than their negatively worded messages. Positively worded injunctive norms were found to be the most effective.

In contrast, negatively worded messages have been found to be most effective in situations where the goal is to decrease the prevalence of an undesired behavior. For example, the Cialdini et al. (2006) study explored the effectiveness of negatively and positively valenced triggers at decreasing the rate of petrified wood theft. Signs triggering injunctive positive, injunctive negative, descriptive positive and descriptive negative messages were placed at different points along the trails in the park with carefully counted piles of wood placed by each. Behavior was assessed by counting the number of pieces of wood missing from each sign

location. Results showed negatively valenced injunctive messages were most effective at decreasing the undesirable behavior of wood theft

### Mechanisms for Social Norms

In addition to investigating the effectiveness of norm interventions through examining ways to create effective norm triggers, researchers extended this line of research by designing studies to explore the mechanisms that are involved when social norms affect behavior. Rimal and his colleagues conducted a series of studies with the goal of increasing the understanding of how social norms interact with other variables to influence decisions about alcohol consumption. Rimal and Real (2003) began this line of research by establishing that descriptive and injunctive norms are conceptually different. In their study, although there was a positive association between perceived prevalence of alcohol use (descriptive norms) and self-reported alcohol consumption, when other factors were included in the statistical models, descriptive norms did not predict consumption. They speculated that descriptive norms affect other variables that in turn affect consumption and contended that in order to reduce alcohol consumption it would be necessary to understand injunctive pressures that students face. In their study, perceived benefit to oneself, group identity and communication patterns emerged as important factors in understanding how social norms affect behavior.

Continuing the line of research focused on the understanding the processes through which normative beliefs influence health-related decisions, Rimal and Real (2005) proposed and tested the TNSB. In their survey of a large sample of college students, they found support for the contention that injunctive norms, outcome expectations, and group identity were moderators in the relationship between descriptive norms and behavioral intentions with regard to alcohol consumption, reporting that the inclusion of these mechanisms dramatically improved the



predictive ability of statistical models. They argue the assumption that simply correcting misperceptions about descriptive norms (in this case providing information that alcohol consumption is actually less prevalent than individuals perceive it to be) will produce behavior change is flawed. They conclude that a complete understanding how norms influence behavior must address the distinction between descriptive and injunctive norms and consider the role of group identity and outcome expectations.

Further support for the TNSB is found in Rimal (2008). He tested the applicability of the TNSB by modeling the relationship between descriptive norms and behavioral intentions in a field based experiment designed to reduce college students' alcohol consumption. Participants in the intervention group were given information to document their peers consumed less alcohol than they might expect, while the control group was not given any information. The normative trigger resulted in a lower estimate of the prevalence of alcohol consumption. The model of the relationship between descriptive norms and behavioral intentions indicated injunctive norms and outcome expectations were moderators and also partial mediators, while group identity was also a moderator, but with a relatively small effect. Moving beyond the study of college students' alcohol consumption, Lapinski, Anderson, Shugart, and Todd (2014) tested applicability of the TNSB in a child care center setting with handwashing as the target behavior. Their results confirmed that the relationship between descriptive norms and behavior was strengthened with positive outcome expectations and stronger group identity. Injunctive norms also moderated the relationship. Specifically, strong injunctive norms were associated with a positive relationship between descriptive norms and behavior, but for individuals who reported weak injunctive norms, the relationship between descriptive norms and behavior was negative.

Based on these studies, researchers using the TNSB accepted the assumption that the moderating role of injunctive norms, outcome expectations, and group identity had been clearly established and began to investigate other factors that might affect the mechanism of change. Real and Rimal (2007) extended TNSB by examining peer communication as a moderator in the relationship between descriptive norms and behavior. They found that increased peer communication about alcohol consumption increased the likelihood that students would consume alcohol and that the inclusion of peer communication in the TNSB model strengthened its predictive utility. In a subsequent study, Rimal and Mollen (2013) tested an extension of the TNSB by examining the influence of issue familiarity. Again using alcohol consumption of college students as the target behavior, they surveyed a large sample of college. Familiarity with the issue of alcohol moderated the influence of descriptive norms on behavioral intentions. Specifically, the relationship between descriptive norms and behavioral intentions was stronger when participants reported a high level of familiarity than when a low level of familiarity was evident. The authors indicated their findings suggest that students enter college with established beliefs about the prevalence and preferences for alcohol consumption and that efforts to address concerns about alcohol consumption need to begin before they enter college, during the high school years, or perhaps even earlier.

Taken together, studies using TSNB as a framework provide evidence that, although there is a relationship between descriptive norms and behavioral intentions, interventions that simply use triggers to change descriptive norms may not be sufficient to produce behavior change. For interventions to be effective in promoting positive health behaviors, they likely need to go beyond correcting misperceptions about the prevalence of a behavior to address the influence of moderating variables between descriptive norms and behavioral intentions.

### Insulators

In addition to the moderators identified within the TNSB framework, researchers have also identified other factors that in some cases may serve to neutralize influence of social norms on behavior, seemingly insulating individuals from the effects of norm perceptions. Self-identity, behavioral intention, and age are three variables that have been examined in this regard.

Self-identity is defined as an individual's domain specific perception of self (i.e. self-identity as an exerciser, self-identify as a parent, etc.). Individuals with strong self-identities related to a specific behavior are not as likely to be influenced by normative messages as those who have not developed that identity. For example, Yun and Silk (2011) explored factors influencing the relationship between norms and healthy food choices and concluded that individuals with low self-identities were the more susceptible to social norms than those with high self-identities as healthy eaters.

Along the same lines, an individual's pre-existing level of behavioral intention is another factor that moderates the relationship between norms and behavior (Rivis & Sheeran, 2003). If an individual has a strong pre-existing behavioral intention to participate in a target behavior prior to being exposed to a norm trigger, than exposure to the trigger may not significantly influence the individual's behavior (Croker, Whitaker, Cooke, & Waddle, 2009). If however, there is a weak level of intention toward a behavior, then the individual is more likely to be influenced by a norm trigger. Age may also be a factor that influences the relationship between norms and behavior. In their meta-analysis Rivis and Sheeran (2003) concluded the relationship between norms and behavior was much stronger among school aged children than adults.

### Normative Misconceptions

Another important concern that has emerged in research on social norms is the accuracy of perceived norms. A focus of the initial work on the prevalence of alcohol consumption by Rimal and his colleagues was to correct misperceptions relevant to descriptive norms, in that college students typically expressed the belief that their peers consumed more alcohol than they actually did. It became evident that providing information to develop more accurate descriptive norms was not in and of itself sufficient to precipitate changes in alcohol consumption in those studies, but it is also apparent that understanding how misperceptions about normative behavior function is an important aspect in the investigation of social norms. The SNA (Berkowitz, 2004; 2005) provides a framework for the investigation of misperceptions and characterizes pluralistic ignorance, false consensus, and false uniqueness as three types of normative misperceptions that have been studied.

Misperceptions characterized as pluralistic ignorance exist when individuals believe they are in the minority when in fact they are not. This translates to an individual believing a behavior is more prevalent than it actually is. Perhaps the most prevalent examples of pluralistic ignorance are found in investigations of college students' alcohol consumption (i.e., Perkins & Berkowitz, 1986, Stock et al., 2014). McAlaney and McMahon (2007) explored the perceptions of peer alcohol consumption among students and reported that students overestimated the proportion of students who drank with the intention of getting drunk by 40%. Trockel, Williams, and Reis (2003) found members of fraternities greatly over estimated their peers' prevalence of alcohol consumption. This phenomenon has been reported across a wide variety of settings in addition to the alcohol consumption literature, including smoking (Elsey et al., 2015) and athlete drug use (LaBrie et al., 2009). In these studies, even though their perceptions were inaccurate, individuals' normative beliefs were predictors of behavior.

False consensus, when individuals believe their actions are consistent with norms when in actuality they are not, has also been observed in a number of contexts including gambling (Larimar & Neighbors, 2003), smoking (LaBrie et al., 2009), risky sex behaviors (Chia & Gunther, 2006), and binge drinking (Stock et al., 2014). Across these settings, individuals who engage in undesirable, risky, or unhealthy behaviors consistently overestimate the prevalence of that behavior relative to their peers who abstain. While there is extensive evidence that misconceptions representative of pluralistic ignorance and false consensus exist, false uniqueness has not been investigated over the past two decades.

In their attempts to understand norm misperceptions, researchers have begun to identify factors that are related to the degree of the misperception. The norm referent group on which the individual bases their perceptions has emerged as an important variable (Bosari & Carey, 2003). As the referent group for the norm becomes broader, the degree of misperception of the norm also grows. For example, Thombs (2000) found that students on an athletic team more accurately estimated their teammates' drinking habits than those of the student body as a whole. Bosari and Carey (2001) found that students in smaller colleges more accurately estimated peer drinking habits than students in larger colleges. Along with referent group, norm type (i.e. injunctive or descriptive) is another factor that has been found to influence the degree of normative misperceptions. In their meta-analysis of 21 studies, Bosari & Carey (2003) concluded that injunctive norms were overestimated to a greater degree than descriptive norms, regardless of age, age, or activity examined.

Several researchers have conducted intervention studies by introducing accurate peer norms into a field setting in an attempt to decrease the prevalence of the undesired behavior by correcting misperceptions (Polonec, Major, & Atwood, 2006). Rather than directly telling an

individual what he/she should or should not do, these studies have generally presented accurate information about what others are doing, or what they approve or disapprove of. Hancock and Henry (2003) used a normative intervention campaign to correct misconception about the prevalence of college students' smoking to reduce the rate of teen smoking by 29%. Perkins and Craig (2003) used signs and electronic media messages to highlight the fact that students' alcohol consumption was lower than most people think and reported a 14% decrease in average drinks at parties. Johannessen and Glider (2003) also explored the use of social norms as an intervention tool to decrease heavy drinking in college students using sign and flyers to inform students that a lower percentage of individuals are heavy drinkers than they perceived. They reported a 29% decrease in the prevalence of heavy drinking over a 3-year period. Jeffery, Negro, Demond, and Frisone (2003) used messages correcting misperceptions about peer excessive alcohol consumptions to decrease the number of students who have 5 or more drinks in one night by 11%. Taken together, these studies support the notion that introducing accurate information about peer norms to correct misperceptions can decrease the incidence of undesirable health behaviors. There has been little investigation, however, concerning misperceptions of norms related to desirable behaviors such as health eating and PA behaviors, Physical Activity

The literature related to how social norms influence a wide range of health behaviors in general is robust, so a logical extension of this framework is to explore the relationships between social norms and PA. Research focused on social norms and PA, however, is relatively sparse. Despite the fact that PA has not been a strong focus in social norms research, there is evidence that norms are related to PA behaviors (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010; Lee, 2011; Lu et al., 2014).

Initial support for the contention that PA behaviors are influenced by social norms is found in studies framed by the TPB. For example, Galea and Bray (2006) applied the TPB to predict walking intentions and behaviors in a sample of older adults experiencing recurring leg pain. They found general support for the TPB and reported a positive relationship between subjective norms and intention to walk. Lee (2011) reported that TPB constructs accounted for a significant proportion of variance in exercise intention and behavior in a sample of Korean American adults. Lee included descriptive norms in his analysis but found that they did not improve the model. Consistent with research in other contexts subjective norms in these two studies were not as influential in predicting intention as other TPB constructs

As research grounded in the FTNC and the TNSB in the health behavior literature gained traction, the need to extend research on subjective norms characterized in the TPB to investigate the influence norms have on PA behavior was evident. Researchers have begun to explore the influence of social norms on PA and there is general support for the notion that social norms can influence individual decisions to be physically active. Both Ball et al. (2010) and Priebe and Spink (2011) investigated the relationship between descriptive social norms and PA and reported that descriptive norms predicted PA. Ball et al. (2010) also concluded that descriptive norms exerted an influence that was independent from social support and suggested potential exists to modify social norms in an intervention to promote increased PA. Lu et al. (2014) examined relationships among self-efficacy, social norms and PA in adolescents. Their measure of social norms can be characterized as injunctive in that the items focused on approval of parents, teachers and friends. Both peer injunctive norms and self-efficacy predicted PA. Additionally, self-efficacy partially mediated the relationship between norms and PA among girls and fully mediated the relationship among boys.

There are also studies that have included the dimensions of descriptive/injunctive and proximal/distal norms and the study of PA. Framed by the TNSB, Yun and Silk (2011) examined the influence of social norms on both intention to exercise and intention maintain a healthy diet. Proximal norms, both descriptive and injunctive, were related to intention to exercise. Self-identity was a significant moderator in that relationship. Using measures of both proximal and distal norms, Randazzo and Solmon (2015) found that proximal injunctive and descriptive norm perceptions, as well as exercise self-identity, predicted PA behavior, while distal norms did not.

Moving beyond correlational designs, a few researchers have tested interventions in field settings designed to increase PA. Burger and Shelton (2011) conducted an observational study to test the effectiveness of descriptive norm information. They selected three elevators in similar physical situations and recorded baseline data for a week. During the second week they posted signs near two of the elevator doors. One sign was designed to trigger a descriptive norm that read, “Did you know? More than 90 percent of the time, people in this building use the stairs instead of the elevator. Why not you?” (p.74). A sign was placed at another elevator that simply presented information about the benefit of taking the stairs that read, “Did you know? Taking the stairs instead of the elevator is a good way to get some exercise” (p. 74). The third elevator did not have a sign and served as a control condition. The usage of the elevator at the site where the descriptive norm was introduced decreased by 46% between the first and second week, but there was no change in usage at either the informational or control site. When the signs were removed during the third week the lower rate of elevator usage was maintained at the site where the descriptive norm was triggered.

Priebe and Spink (2012, 2014, 2015) conducted a series of studies introducing descriptive norm information as triggers to promote PA. Using a pre-posttest design in a two part study,



Priebe and Spink (2012) used e-mail to manipulate normative non-normative messages designed to increase PA. In the first part, they assigned office workers to one of four message conditions: descriptive norms, health, appearance, and control. All messages promoted being active, but the conditions varied according to the rationale offered for being active (i.e., your co-workers are active, for your health, for your appearance, simply promoting PA). A series of four messages were delivered over a three week span. Participants across all conditions reported increased PA at the end of the intervention. As predicted, the descriptive norm condition exhibited a greater increase than the other three conditions. This approach was repeated with college students in the second study, and again, all conditions produced an increase in PA from pre to posttest. With this population, however, the descriptive norm messages were not more effective than the other messages. The authors suggested that a possible explanation for this was that the descriptive norm for the office workers could have been perceived as more proximal (a closer referent group) than for the university students, where the reference group was all students, which could have been more distal.

In a subsequent study, Priebe and Spink (2015) tested this assertion in a study using descriptive norm messages designed to increase light PA and decrease sedentary behavior in the work place. In a pretest survey they assessed PA levels and reasons for being active. They varied the norm messages delivered via e-mail with regard to the reference group characteristics, outlining four conditions. The first group received an email trigger with information about the frequency of PA at the facility where the participants worked and gave the same reason the participants gave for being physically active. The second group received an email trigger with the frequency of PA at the facility where participants worked but gave a different reason than participants had for being physically active. The third group received an email trigger about the

frequency of PA at a different facility but that gave the same reason the participants had given for being physically active. The fourth group received an email trigger referencing a different facility and a different reason than participants had for being physically active. They concluded that descriptive norm messages can increase light PA and decrease sedentary behavior, but they did not detect differences according to the reference group.

Generally these intervention studies have used a pre-posttest design that relied on self-reported PA. Priebe and Spink (2014) employed an experimental design to examine the influence of descriptive norm information on a muscular endurance task. A group of adults were randomly assigned to either receive descriptive normative information or to the control conditions. Individuals completed a maximum endurance plank followed by a rest period. Individuals in the treatment condition were told that 80% of their peers were able to hold their second plank at least 20% longer than the first attempt, while the control condition was not given any information. Individuals who received the descriptive normative information held their plank longer on the second attempt, while performance for individuals who did not receive the information actually declined. When controlling for initial performance, the intervention group performed significantly better than the control group on the second trial. Additionally, the normative information was associated with increased task self-efficacy for the second trial. This study is significant in that it provides objective evidence, as opposed to self-reported PA, that normative information can influence exercise behavior.

### Summary and Conclusion

Social norms are a very complex construct. As research in the area of social norms has evolved, there is clear evidence from correlational studies framed by the FTNC that descriptive norms are positively associated with both intention and behavior. The utility of norms as a

behavioral intervention tool has been demonstrated repeatedly over a myriad of behaviors including increasing healthy eating habits, increasing energy conservation, and decreasing binge drinking (Gockeritz et al., 2013; Rimal, 2008; Robinson et al., 2014). The evidence exists across a wide variety of behavioral contexts, and there is a nucleus of work that focuses on health-related behaviors. Injunctive norms are also related to intentions and behaviors, but those relationships have generally been weaker as compared to descriptive norms. Proximal norms have a stronger influence on intentions and behaviors than distal norms.

Field-based studies have provided evidence that interventions to change behavior through providing information about social norms can increase positive health related behaviors and decrease undesirable behaviors (Mollen, Rimal, Ruiter, & Kok, 2013). Interventions relay on triggers to elicit both descriptive and injunctive norms, and several studies have explored the effectiveness of different types of triggers. Introduction of triggers that are not properly designed can yield unintended consequences (Cialdini et al. 2006). Proximal triggers are generally more effective than distal triggers (Goldstein et al., 2008). The valence of a trigger, positive or negative, has also been explored. Generally positively worded triggers have been more effective in eliciting desirable behaviors while negative wording is more effective in decreasing undesirable behaviors.

With the evolution of the TNSB it became apparent that simply changing descriptive norms might not be sufficient to change behavior (Rimal & Real, 2005). The TNSB model asserts that the influence of descriptive norms on behavior may not be direct and that there are moderators between descriptive norms and behavior. In other words, descriptive norms may affect other variables that in turn produce a change in behavior. The normative mechanisms outlined in TNSB are recognizes injunctive norms, outcome expectations group identity. Other

mechanisms, such as peer communication (Rimal & Real, 2007) and issue familiarity (Rimal & Mollen, 2013) have also been explored.

With regard to PA, there is evidence that social norms are related to decisions about exercising and being physically active, but the body of research is sparse. Although the research has not been extensive, the studies that have addressed social norms and PA support the conclusion that there is a positive association between descriptive norms and PA behavior, and that appropriately worded normative triggers can increase PA. Although this area shows promise, the understanding of how social norms can be used to promote and maintain physically active lifestyles is not fully developed.

### Implications

Investigating the use of the use of social norm interventions to increase PA levels can be a key addition to the arsenal of public health tools. Evidence from intervention studies suggests that providing accurate normative information relevant to health behaviors can promote positive behaviors and decrease the incidence of negative behaviors. So, the implication from this work is that providing appropriate normative triggers about positive health behaviors is one element in creating an environment that can facilitate health behaviors. Social norm interventions are inexpensive to create and require minimal effort, so if they are easy to understand, they can be utilized by a wide variety of people to increase PA levels and other health behaviors in a wide variety of situations.

### Directions for Future Research

The long term goal for future research is to develop effective methods for norm interventions to increase PA focusing on implementing real world interventions. With regard to the PA literature, several areas of study that would contribute to that overall goal have not been

investigated. The relationship between injunctive norms and PA behavior is unclear and has not been thoroughly explored. Along that line, the mechanisms for change outlined in the TNSB have also not been studied. In particular, the study of self-efficacy and self-identity as mechanisms for change seem to be factors that need to be investigated. Additionally, misperceptions of social norms about PA and the effect they have on behavior have not been addressed. Finally, more long term studies are needed to document the duration of the effect of norm interventions.

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## APPENDIX B: INFORMED CONSENT STUDY ONE

### Consent Form

1. **Study Title:** Exploring the Relationships among Social Norms, Identity, Outcome Expectations and Physical Activity.
2. **Performance Site:** Louisiana State University and Agricultural and Mechanical College
3. **Investigators:** The following investigators are available for questions about this study, M-F, 8:00a.m. -4:30p.m. Mr. Keith Randazzo- 225-578-5714; Dr. Melinda Solmon- 225-578-2913
4. **Purpose of the Study:** The purpose of this research is to examine the influence of social norms on student physical activity levels.
5. **Number of subjects:** 383
6. **Study Procedures:** Researchers will administer questionnaires to all consenting students April 26, 2016 at the start of regularly scheduled class. The names will be replaced with numbers to ensure anonymity.
7. **Benefits:** Subjects will not receive any monetary compensation for their participation in the study.
8. **Risks:** There are no foreseeable risks to this research project. A numeric code will be used to ensure that outside individuals will not be able to link questionnaire back to participants. All informed consent sheets and questionnaires will be stored in secure cabinets. Investigators will be the only individuals with access to the data.
9. **Refuse:** Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.
10. **Privacy:** Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.
11. **Signature:** The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225) 578-8692, [irb@lsu.edu](mailto:irb@lsu.edu), [www.lsu.edu/irb](http://www.lsu.edu/irb). I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Subject Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Institutional Review Board  
Dr. Dennis Landin, Chair  
130 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
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## APPENDIX C: STUDY ONE INSTRUMENTATION

### Survey of Social Norm and PA Factors

Age \_\_\_\_\_ Gender \_\_\_\_\_ Do you identify as Hispanic/Latino/Latina (circle one): Yes / No

**Please choose the term/terms you would use to identify your race (circle all that apply):**

American Indian    Asian    African American    Pacific Islander    Caucasian    Other \_\_\_\_\_

**Classification (circle one):** Freshman Sophomore    Junior    Senior

**Residence (Circle one):** On campus    Off Campus

**For the questions below circle from 1-7 the level you agree or disagree with each statement  
(1 = strongly disagree; 7 = strongly agree)**

	Strongly Disagree						Strongly Agree
1. Most of my friends exercise.	1	2	3	4	5	6	7
2. I think of myself as the type of person who is concerned about the long-term effects of my exercise choices.	1	2	3	4	5	6	7
3. Most of my friends are physically active.	1	2	3	4	5	6	7
4. I think my friends who exercise regularly are respectable.	1	2	3	4	5	6	7
5. Most of the friends I hangout with support that I exercise.	1	2	3	4	5	6	7
6. I think of myself as a physically active person.	1	2	3	4	5	6	7
7. I admire my friends who exercise regularly.	1	2	3	4	5	6	7
8. I think of myself as someone who generally thinks carefully about the health consequences of my exercise choices.	1	2	3	4	5	6	7
9. I am determined to exercise at least 3 times a week during the next month.	1	2	3	4	5	6	7
10. I think my friends who exercise regularly are similar to me intellectually.	1	2	3	4	5	6	7
11. I think of myself as someone who exercises to be healthy	1	2	3	4	5	6	7
12. I think my friends who exercise regularly have values that are similar to my own.	1	2	3	4	5	6	7
13. I intend to exercise at least 3 times a week during the next month.	1	2	3	4	5	6	7
14. Most of the friends I hangout with would approve of my exercising.	1	2	3	4	5	6	7
15. I think my friends who exercise regularly are similar to me in the way they think.	1	2	3	4	5	6	7
16. Most of my friends would endorse my being physically active.	1	2	3	4	5	6	7
17. I think my friends who exercise regularly behave similarly to the way I do.	1	2	3	4	5	6	7
18. Most of my friends maintain an exercise program	1	2	3	4	5	6	7
19. I look up to my friends who exercise regularly.	1	2	3	4	5	6	7
20. I plan to exercise/play sport at least 3 times a week during the next month.	1	2	3	4	5	6	7
21. I think my friends who exercise regularly are inspiring.	1	2	3	4	5	6	7

**\*For the questions below circle from 1-5 the level you agree or disagree with each statement  
(1 = strongly disagree; 5= strongly agree)**

	<b>Strongly Disagree</b>			<b>Strongly Agree</b>	
<b>22.</b> Exercise makes me feel better physically.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>23.</b> Exercise makes my mood better in general.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>24.</b> Exercise helps make me feel less tired.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>25.</b> Exercise makes my muscles stronger.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>26.</b> Exercise is an activity I enjoy doing.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>27.</b> Exercise gives me a sense of personal accomplishment.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>28.</b> Exercise makes me more alert mentally.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>29.</b> Exercise improves my endurance in performing my daily activities.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>30.</b> Exercise helps to strengthen my bones.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**During a typical 7-Day period (a week), how many times on average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number)?**

Type of Activity	Times per Week
<b>31.</b> Strenuous Exercise (heart beats rapidly) (e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)	
<b>32.</b> Moderate Exercise (Not exhausting) (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)	
<b>33.</b> Mild Exercise (minimal effort) (e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)	

**34. During a typical 7-Day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)? (Circle One)**

**Often**

**Sometimes**

**Never**

## APPENDIX D: STUDY TWO INFORMED CONSENT

1. **Study Title:** Exploring the long-term influence of social norm interventions on physical activity levels in college students.
2. **Performance Site:** Louisiana State University and Agricultural and Mechanical College
3. **Investigators:** The following investigators are available for questions about this study, M-F, 8:00a.m. -4:30p.m. Mr. Keith Randazzo- 225-578-5714; Dr. Melinda Solmon- 225-578-2913
4. **Purpose of the Study:** The purpose of this research is to examine the effects of social norms on PA.
5. **Number of subjects:** 102
6. **Study Procedures:** Researchers will administer questionnaires to all consenting students the first week of the semester (Jan 13-March 1). The names will be replaced with numbers to ensure confidentiality.
7. **Benefits:** Subjects will not receive any monetary compensation for their participation in the study.
8. **Risks:** There are no foreseeable risks to this research project. A numeric code will be used to ensure that outside individuals will not be able to link study results. All informed consent sheets and questionnaires will be stored in secure cabinets. Investigators will be the only individuals with access to the data.
9. **Refuse:** Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.
10. **Privacy:** Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.
11. **Signature:** The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225) 578-8692, [irb@lsu.edu](mailto:irb@lsu.edu), [www.lsu.edu/irb](http://www.lsu.edu/irb). I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Subject Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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## APPENDIX E: PAR-Q

Physical Activity Readiness  
Questionnaire - PAR-Q  
(revised 2002)

# PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
<input type="checkbox"/>	<input type="checkbox"/>	1. Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor?
<input type="checkbox"/>	<input type="checkbox"/>	2. Do you feel pain in your chest when you do physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	3. In the past month, have you had chest pain when you were not doing physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	4. Do you lose your balance because of dizziness or do you ever lose consciousness?
<input type="checkbox"/>	<input type="checkbox"/>	5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
<input type="checkbox"/>	<input type="checkbox"/>	7. Do you know of any other reason why you should not do physical activity?

If  
you  
answered

### YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

### NO to all questions

- If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:
- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
  - take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

#### DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

**PLEASE NOTE:** If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

**Informed Use of the PAR-Q:** The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

**No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.**

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."

NAME \_\_\_\_\_

SIGNATURE \_\_\_\_\_

SIGNATURE OF PARENT \_\_\_\_\_  
or GUARDIAN (for participants under the age of majority)

DATE \_\_\_\_\_

WITNESS \_\_\_\_\_

**Note: This physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.**



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## APPENDIX F: STUDY TWO INSTRUMENTATION

### Abdominal Plank Efficacy and Peer Norms (Pre)

Gender \_\_\_\_\_ Age \_\_\_\_\_ Do you identify as Hispanic/Latino/Latina (circle one) Yes / No

**Please choose the term/terms you would use to identify your race (circle all that apply):**

"American Indian or Alaska Native,"

"Asian,"

"Black or African American,"

"Native Hawaiian or Other Pacific Islander,"

"White"

Other \_\_\_\_\_

**Have you performed an abdominal plank within the last year (circle one)?** Yes No

**For questions below circle from 0%-100% how confident you are that you could perform a plank for the average time as peers of your same age and gender (0%=I know I absolutely cannot; 100%= I know I absolutely can).**

	I Can't	Maybe	I Can								
1. Rate your confidence in your ability to hold an abdominal plank <b>within at least 80%</b> of the average time for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2. Rate your confidence in your ability to hold an abdominal plank <b>at least 90%</b> of the average for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
3. Rate your confidence in your ability to hold an abdominal plank for the <b>same amount of time</b> as the average for your peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
4. Rate your confidence in your ability to hold an abdominal plank for at least <b>10% longer</b> than the average time for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
5. Rate your confidence in your ability to hold an abdominal plank for at least <b>20% longer</b> than the average time for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

## Abdominal Plank Efficacy and Peer Norms (MidA)

For questions below circle from 0%-100% how confident you are that you can perform your second plank for the times given below (0%=I know I absolutely cannot; 100%= I know I absolutely can).

	I Can't	Maybe	I Can
1. Rate your confidence in your ability to hold the second abdominal plank for at least <b>80%</b> of the time than you held the first plank.	0%	10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	
2. Rate your confidence in your ability to hold the second abdominal plank for at least <b>90%</b> of the time that you held the first plank.	0%	10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	
3. Rate your confidence in your ability to hold the second abdominal plank for at least the <b>same amount of time</b> you held the first plank.	0%	10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	
4. Rate your confidence in your ability to hold the second abdominal plank for <b>10% longer</b> than you held the first plank.	0%	10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	
5. Rate your confidence in your ability to hold the second abdominal plank for <b>20% longer</b> than you held the first plank.	0%	10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	

6. What do you think happened when others like you (i.e., same age range, sex, and fitness level) performed their second timed plank hold? (**Circle One**)

Decreased 40%      Decreased 20%      Decreased 10%      Same Amount  
 Increased 10%      Increased 20%      Increased 40%



## Abdominal Plank Efficacy and Peer Norms (MidB)

**For questions below circle from 0%-100% how confident you are that you can perform your second plank for the times given below (0%=I know I absolutely cannot; 100%= I know I absolutely can).**

	I Can't	Maybe	I Can								
7. Rate your confidence in your ability to hold the second abdominal plank for at least <b>80%</b> of the time than you held the first plank.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
8. Rate your confidence in your ability to hold the second abdominal plank for at least <b>90%</b> of the time that you held the first plank.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
9. Rate your confidence in your ability to hold the second abdominal plank for at least the <b>same amount of time</b> you held the first plank.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10. Rate your confidence in your ability to hold the second abdominal plank for <b>10% longer</b> than you held the first plank.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
11. Rate your confidence in your ability to hold the second abdominal plank for <b>20% longer</b> than you held the first plank.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

## Abdominal Plank Efficacy and Peer Norms (Post)

For questions below circle from 0%-100% how confident you are that you could perform a plank for the average time as peers of your same age and gender (0%=I know I absolutely cannot; 100%= I know I absolutely can).

	I Can't	Maybe	I Can								
1. Rate your confidence in your ability to hold an abdominal plank <b>for at least 80%</b> of the average time for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2. Rate your confidence in your ability to hold an abdominal plank for <b>at least 90%</b> of the average for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
3. Rate your confidence in your ability to hold an abdominal plank for at least the <b>same amount of time</b> as the average for your peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
4. Rate your confidence in your ability to hold an abdominal plank for at least <b>10% longer</b> than the average time for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
5. Rate your confidence in your ability to hold an abdominal plank for at least <b>20% longer</b> than the average time for peers of your same age and sex.	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

For the questions below circle from 1-7 the level you agree or disagree with each statement  
(1 = strongly disagree; 7 = strongly agree)

	Strongly Disagree	Strongly Agree
7. The information about others performance was believable.	1 2 3 4 5 6 7	
8. The information about others performance was relevant.	1 2 3 4 5 6 7	
9. The information about others performance was easy to understand.	1 2 3 4 5 6 7	
10. The information about others performance was persuasive.	1 2 3 4 5 6 7	

## APPENDIX G: STUDY TWO SCRIPT

### **-Pre:**

*“Thank you for participating in this study. You will perform two maximal effort abdominal planks. Your plank times will be averaged together. The average time will then be added to the data base of college student plank times. Before we begin I will show you a 30 second video on proper plank form. After the video you will perform your first plank. You will not be told your times; you should simply try your hardest and hold the plank as long as you can. Following plank one you will have a three minute rest period and then perform plank 2. Do you have questions?”*

### **-Mid:**

Positive trigger:

*“In previous studies scores on the second plank have typically increased. Specifically, the majority of male/female students in your age range held their second plank for at least 20% longer than their first plank.”*

-Negative trigger:

*“In previous studies scores on the second plank have typically decreased. Specifically, the majority of male/female students in your age range held their second plank for less than 80% as long as than their first plank.”*

### **-Post:**

*“Good job!”*

### **-Debriefing after filling out all forms:**

*“Thank you for participating in this study. The goal of the study was not actually to develop a data base of plank times but rather to test the effect of normative information on behavior. Please do not tell anyone else in your classes about this study as they may also be participating in this study and knowing about your experience beforehand could affect their outcome. Thank for your cooperation.”*

## APPENDIX H: COPY OF IRB APPROVAL FORMS

### ACTION ON EXEMPTION APPROVAL REQUEST



**TO:** Keith Randazzo  
Kinesiology

**FROM:** Dennis Landin  
Chair, Institutional Review Board

**DATE:** August 17, 2015

**RE:** IRB# E9444

**TITLE:** Exploring the long term influence of social norm interventions on physical activity levels  
in college students

Institutional Review Board  
Dr. Dennis Landin, Chair  
130 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
F: 225.578.5983  
[irb@lsu.edu](mailto:irb@lsu.edu) | [lsu.edu/irb](http://lsu.edu/irb)

**New Protocol/Modification/Continuation:** New Protocol

**Review Date:** 8/14/2015

**Approved** X **Disapproved** \_\_\_\_\_

**Approval Date:** 8/17/2015 **Approval Expiration Date:** 8/16/2018

**Exemption Category/Paragraph:** 1; 2a

**Signed Consent Waived?:** No

**Re-review frequency:** (three years unless otherwise stated)

**LSU Proposal Number** (if applicable):

**Protocol Matches Scope of Work in Grant proposal:** (if applicable)

**By:** Dennis Landin, Chairman 

**PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –  
Continuing approval is CONDITIONAL on:**

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects\*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE:**

*\*All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>*

## ACTION ON EXEMPTION APPROVAL REQUEST



**TO:** Keith Randazzo  
Kinesiology

**FROM:** Dennis Landin  
Chair, Institutional Review Board

**DATE:** January 12, 2016

**RE:** IRB# E9720

**TITLE:** If all my friends are doing it; examining the effect of social norm triggers on physical activity effort

Institutional Review Board  
Dr. Dennis Landin, Chair  
130 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
F: 225.578.5983  
[irb@lsu.edu](mailto:irb@lsu.edu) | [lsu.edu/irb](http://lsu.edu/irb)

**New Protocol/Modification/Continuation:** New Protocol

**Review Date:** 1/12/2016

**Approved**     X     **Disapproved**           

**Approval Date:** 1/12/2016 **Approval Expiration Date:** 1/11/2019

**Exemption Category/Paragraph:** 1; 2a

**Signed Consent Waived?:** No

**Re-review frequency:** (three years unless otherwise stated)

**LSU Proposal Number** (if applicable):

**Protocol Matches Scope of Work in Grant proposal:** (if applicable)

**By:** Dennis Landin, Chairman 

**PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –  
Continuing approval is CONDITIONAL on:**

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects\*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc.**

*\*All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>*

## VITA

Keith Randazzo is a native of Louisiana, born and reared in New Orleans. Keith earned his bachelor's degree from Louisiana Tech University in 2010 and during this time was active with athletics as student athletic trainer and strength and conditioning intern. In 2011 while completing his master's degree in Kinesiology at Louisiana Tech University Keith was hired by the investors of Victory Sport Academy (VSA) as their director of operations. He was charged with leading efforts to establish a new sport performance facility in West Monroe, Louisiana. During his tenure at VSA Keith created performance programming, managed staff training and development, ran the day to day operations of the facility, and personally trained a number of collegiate and professional athletes. In fall 2012 Keith left VSA to pursue his doctoral studies at Louisiana State University (LSU).

As a graduate teaching assistant for LSU from 2012-2016 Keith was the instructor of record for a number of activity classes as well as Psychosocial Aspects of Physical Activity, a core lecture course required of all Kinesiology majors. He also taught that course online and created and taught the independent study course Sports Performance Training for Coaches. Keith also received a graduate award in 2015 from the Association of Applied Sports Psychology (AASP) for his presentation at their 2015 national conference.

In addition to his responsibilities as a graduate teaching assistant Keith served as a member of the governing board for the Abundance of Desire Community Center. This board over sees the implementation of a multimillion dollar FEMA grant used for the creation of a large community center in the upper ninth ward of New Orleans. Keith also served as a volunteer high-school softball, basketball, and baseball coach with a local area Baton Rouge school.