Tracing How Normative Messages May Influence Physical Activity Intention

René van Bavel,¹ Gabriele Esposito,¹ Tom Baranowski,² and Néstor Duch-Brown¹

¹European Commission; ²Baylor College of Medicine

Normative messages have been shown to increase intention to do physical activity. We traced how “positive” and “negative” normative messages influenced physical activity intention by comparing constructs of the model of goal-directed behavior with descriptive norms (MGDB + DN) across control and treatment groups in an experiment. For this purpose, 16–24-year-old respondents ($n = 1,200$) in Bulgaria, Croatia, and Romania were asked about their age, sex, and levels of physical activity before being exposed to positive and negative normative messages and completing a questionnaire with MGDB + DN scales. Different MGDB + DN constructs were influenced by the normative messages: compared with the control, the negative message group showed stronger attitudes ($p = .003$) and the positive message group showed higher positive anticipated emotions ($p = .005$). The positive message’s effect is consistent with the literature on conformity to social norms. The negative message’s effect lends itself to interpretations based on social identity and deviance regulation theories.

Keywords: descriptive norms, exercise psychology, health behavior, model of goal-directed behavior, theory of planned behavior, young adults

Increased levels of moderate and vigorous physical activity (PA) are beneficial for the general population, and therefore, recommended by public health institutions (Department of Health and Human Services, 2008; World Health Organization, 2010). However, because getting people to be physically active is no easy task (Latimer et al., 2008; Randolph & Viswanath, 2004), PA has become a fertile ground for psychological research hoping to contribute to better tailored and more effective interventions (Gallagher & Updegraff, 2012; Poobalan, Aucott, Clarke, & Smith, 2012). One such research avenue involves the effects of normative messaging.

Normative messages can influence PA by capitalizing on descriptive norms (DNs), that is, perceptions of what most other people are doing (Cialdini, Reno, & Kallgren, 1990). DNs correlate with behavior because people take cues from observing what others do (Rivis & Sheeran, 2003). However, the evidence for their impact on PA is mixed (Priebe & Spink, 2012). Some studies have not demonstrated an impact (Jackson, Smith, & Conner, 2003; Lazuras, Ourda, Barkoukis, & Tsorbatzoudis, 2011; Slaunwhite, Smith, Fleming, & Fabrigar, 2009), whereas others have (Fitzgerald, Fitzgerald, & Aherne, 2012; Humbert et al., 2006; Priebe & Spink, 2011; Spink, Crozier, & Robinson, 2013).

A recent study examined the effect of normative messages on PA intention (van Bavel, Esposito, & Baranowski, 2014) guided by two hypotheses predicted by the literature on conformity to social norms (Asch, 1951; Sherif, 1935). The first hypothesis posited that if participants were told most people like them were physically active (positive normative message), they would indicate a greater intention to engage in PA. The second hypothesis posited that the opposite should also hold true: If participants were told most people like them were not physically active (negative normative message), they would indicate a lower intention to engage in PA. Results showed that the former was true, but not the latter. Negative normative messages also increased PA intention. Some of this impact may have been due to a *priming* effect (Kahneman, 2011), whereby respondents stated a higher intention merely because the issue was made salient to them (regardless of whether the

© 2017 The Authors. Published by Human Kinetics, Inc. This is an Open Access article distributed under the terms of the Creative Commons Attribution License CC BY 4.0, which permits unrestricted noncommercial and commercial use, distribution, and reproduction in any medium, provided the original work is properly cited, the new use includes a link to the license, and any changes are indicated. See <https://creativecommons.org/licenses/by/4.0/>. This license does not cover any third-party material which may appear with permission in the article.

René van Bavel, Gabriele Esposito, and Néstor Duch-Brown are with Joint Research Centre, European Commission, Sevilla, Spain. Tom Baranowski is with Children’s Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, TX. Gabriele Esposito is now working elsewhere in the European Commission. The views expressed are those of the authors and may not under any circumstances be regarded as stating an official position of the European Commission. Address author correspondence to René van Bavel at rene.van-bavel@ec.europa.eu.

message was positive or negative). However, even if this priming effect was considered, the positive normative message should have increased intention by a higher degree than the negative normative message, but this was not the case. When compared, the magnitude of effect of both messages was unexpectedly the same.

This paper analyses how both positive and negative normative messages influenced intention, relying on an extension of the model of goal-directed behavior (MGDB; Perugini & Bagozzi, 2001) applied to PA. The extension consists of including DN as an explanatory factor (resulting in MGDB + DN). MGDB is based on the theory of planned behavior (TPB; Ajzen, 1985). TPB has been one of the main predictive models used in PA and provides a framework for tracing how normative messages influence PA intention (Ajzen, 2015; Downs & Hausenblas, 2005; Hagger, Chatzisarantis, & Biddle, 2002; Montano & Kasprzyk, 2015).

In its simplified form, TPB suggests that the most proximal determinant of behavior is *intention* to behave. In turn, intention is determined by an individual's *attitudes* (positive evaluations of behavior), *subjective norms* (perceptions of what most other people, who are relevant to the individual, think he or she ought to do), and *perceived behavioral control* (the degree to which individuals think behavior is under their control, which also has a direct impact on behavior).

MGDB expanded TPB by introducing the constructs of *desire* (future orientation evaluating outcomes as desirable or undesirable) and *positive* and *negative anticipated emotions* (affective reactions to future events). It has shown greater explanatory power in certain instances (Perugini & Conner, 2000; Taylor, Bagozzi, & Gaither, 2005) and is a promising, if less established, model for these purposes.

In van Bavel et al.'s (2014) study, respondents were asked to fill out a questionnaire with MGDB + DN scales after being exposed to normative messages. The variables that are presumed to have an impact on desire and intention in the model (e.g., attitudes, descriptive and injunctive norms, perceived behavioral control, and positive and negative anticipated emotions) were, therefore, subject to the influence of the normative messages—just as intention.

The guiding hypothesis for this study was that the normative messages had to influence intention through different means because they made opposite claims. The absence of such a difference, by contrast, would indicate that the content of the normative messages was not relevant (i.e., impact on intention was due solely to a *priming effect*; Kahneman, 2011). Specifically:

Hypothesis 1. The mean value of the constructs presumed to have an effect on desire and intention in the MGDB + DN model will be different in the group exposed to the positive normative message than in the control group.

Hypothesis 2. The mean value of the constructs presumed to have an effect on desire and intention in

the MGDB + DN model will be different in the group exposed to the negative normative message than in the control group.

Hypothesis 3. The constructs that show differences in mean value between the treatment and control groups will not be the same in the positive message group versus control group comparison than in the negative message group versus control group comparison.

Method

All data were obtained through a survey of 1,200 Internet users, aged 16–24, in Bulgaria, Romania, and Croatia, as part of a European Commission study on PA. These Southeastern European countries offered a pertinent context for a study with public health implications because the region was left with weakened public health infrastructures following the end of Communist regimes and the break up of Yugoslavia (World Health Organization, 2009). In addition, these countries lack infrastructures for facilitating PA. Only 20% of the population in Bulgaria, 30% in Croatia, and 33% in Romania agreed that local sports clubs and other local providers offered many opportunities to be physically active, compared with the European Union average of 68% (European Commission, 2006). The study focused on young adults because they are particularly vulnerable to weight gain (Huang et al., 2003) and can be difficult to reach through public health campaigns (Poobalan et al., 2012).

The survey was administered by Block de Ideas, a social research company based in Barcelona, Spain. They administered the questionnaire online to survey panels until they reached 400 completed questionnaires per country. The full data ($n = 1,200$) were therefore complete without missing values. The internal Evaluation Committee set up at the Institute for Prospective Technological Studies approached the study as a questionnaire with a split-ballot and sought adherence to the appropriate ethical guidelines for conducting surveys. Informed consent was obtained from all participants to the study following the guidelines of ESOMAR, the World Association for Social, Opinion and Market Research (including their Guideline on Interviewing Children and Young People).¹ Their data were anonymized and used only for the purpose of this research.

The Normative Messages

Before answering the questionnaire, respondents were randomly assigned to the control, positive, or negative message groups (stopping after the number 400 was reached in each group). The only significant difference in the demographics of the control and treatment groups was in dropout rates according to gender: men dropped out 21.8% of time and women 26.4% of time (van Bavel et al., 2014).

In the positive message group ($n=400$; 133 in Bulgaria, 133 in Croatia, and 134 in Romania), respondents were exposed to a personalized, positive normative message presented in three successive screens. The message was tailored to the respondent's age, gender, and country of residence revealed by background information obtained from questions in the beginning of the questionnaire. This feature was introduced to capitalize on the *provincial effect*, which has been shown to increase the effectiveness of normative messages (Goldstein, Cialdini, & Griskevicius, 2008). This first screen stated explicitly: "over 79% of [respondent's age] year-old [respondent's gender] in [respondent's country of residence] do moderate physical activity for at least 30 minutes on most days of the week." This percentage was consistent within conditions, over countries, and participants. Two subsequent screens reinforced this message: the first with a graphic illustration of the same message (Figure 1) and the next with a photograph of an attractive young couple running (van Bavel et al., 2014).

In the negative message group ($n=400$; 133 in Bulgaria, 134 in Croatia, and 133 in Romania), respondents were exposed to the negative normative message, which was identical in structure but claimed the opposite as the positive message (i.e., over 79% of people of the same age, gender, and country of residence as the respondent did not engage in more than 30 min of PA on most days of the week). As with the positive message, two subsequent screens reinforced this message: the same graphic illustration, but with the facts inverted, and a photograph of an attractive young couple lounging on a sofa (van Bavel et al., 2014). As the only behavioral

Figure 1 — Two screens of the positive normative message. *Note.* Messages were tailored to individual respondents: “@1” was replaced with their age; “@2” with their gender; and “@3” with their country of residence. Adapted from “Is Anybody Doing It? An Experimental Study of the Effect of Normative Messages on Intention to Do Physical Activity,” by R. van Bavel, G. Esposito, and T. Baranowski, 2014, *BMC Public Health*, 14(1), p. 778.

change technique being tested was the inclusion of a normative message (albeit reinforced with graphic illustrations and a photograph), the control group ($n=400$; 134 in Bulgaria, 133 in Croatia, and 133 in Romania) did not receive a normative message.

Scales

The scales in this questionnaire were based on validated TPB and MGDB scales (Esposito, van Bavel, Baranowski, & Duch-Brown, 2016). In the case of TPB, the scales had previously been applied to PA specifically (Hagger, Chatzisarantis, Biddle, & Orbell, 2001; Hales, Evenson, Wen, & Wilcox, 2010). As MGDB had not been applied to PA previously, these scales were either general (Perugini & Bagozzi, 2001; Perugini & Conner, 2000) or applied to other health-related behaviors (Baranowski et al., 2013). All scales were constructed using 7-point binary adjective items.

The construct of DNs was added, as they are pertinent to this study of normative messages. They have been introduced in some studies as an element of subjective norms in TPB (Rivis & Sheeran, 2003) and MGDB (Esposito et al., 2016). In this paper, the concept of subjective norms is divided in two: injunctive norms, the traditional conceptualization of subjective norms in TPB, and DNs, perceptions of what most other people who are relevant to the individual are doing (Cialdini et al., 1990). Behavior could not be the primary dependent variable in these analyses as inadequate time elapsed for the messages to influence it.

Confirmatory factor analysis on the control group tested the model fit of TPB, MGDB, TPB including DNs (TPB + DNs), and MGDB including DNs (MGDB + DNs). A full list of the items used to measure all constructs and the reliability observed for each scale are presented in Esposito et al. (2016). Only MGDB and MGDB + DNs were fit for purpose, following Hu and Bentler's (1999) two-index strategy. Further analysis using structural equation modeling showed that MGDB + DNs had greater explanatory power than MGDB (Esposito et al., 2016). Therefore, in this study, we used MGDB + DNs (Figure 2).

We also conducted structural equation modeling to identify the impact of attitudes, injunctive norms, DNs, positive and negative anticipated emotions, and perceived behavioral control on desire, and of desire on intention, in both the positive and negative message groups. This singled out those constructs that could account for the difference in intention across groups. If a construct had a significant impact on desire (or intention) in the control group, but not in the positive or negative message group, it warranted interest. The reverse was also true: A construct that was not significant in the control group but significant in the positive or negative message group was of interest. Those that could be ruled out for further analysis were those that were not significant (at the .05 level) in the control group nor in the positive or negative message group. The only

Figure 2 — Structural equation modeling results for MGDB + DNs in the control and treatment groups: (a) control group ($n = 400$), (b) positive message group ($n = 400$), and (c) negative message group ($n = 400$). *Note.* Structural equation modeling results are reported with standardized coefficients and controlled for age, sex, and country of residence. MGDB + DNs = model of goal-directed behavior with descriptive norms. Results for the control group were adapted from “Applying the Model of Goal-Directed Behavior, Including Descriptive Norms, to Physical Activity Intentions: A Contribution to Improving the Theory of Planned Behavior,” by G. Esposito, R. van Bavel, T. Baranowski, and N. Duch-Brown, 2016, *Psychological Reports*, 119(1), p. 5. Level of significance: * $p < .1$, ** $p < .05$, *** $p < .01$.

construct that fits those criteria was *injunctive norms*, possibly because the impact of this construct was mitigated by the presence of DNs.

Results

MGDB + DNs was used to trace the influence of normative messages on intention. We conducted confirmatory factor analysis on MGDB + DNs in both the positive and negative normative message groups to confirm it was fit for purpose in those subsamples (Table 1). In both, root mean square error of approximation (RMSEA) $\leq .06$ (.057 in the positive group and .053 in the negative group) and standardized root mean square residual (SRMR) $\leq .09$ (.068 in both), satisfying one of the two index conditions for goodness-of-fit (Tucker–Lewis index $\geq .96$ and

SRMR $\leq .09$; RMSEA $\leq .06$ and SRMR $\leq .09$; or CFI $\geq .96$ and SRMR $\leq .09$) required (Hu and Bentler 1999).

We compared the means of all constructs except *injunctive norms* for each treatment group versus the control group (Table 2). Three significant results were identified. *Positive anticipated emotions* was significantly higher in the positive message group than in the control group ($MD = .199$, $p < .01$). *Attitudes* was significantly higher in the negative message group compared with the control group ($MD = .176$, $p < .01$). Finally, *desire* was significantly higher in both the positive and negative message groups compared with the control group ($MD = .268$, $p < .01$ and $MD = .187$, $p < .05$, respectively).

Because the mean value of the constructs presumed to have an effect on desire and intention in the MGDB +

Table 1 Model Fit Indices of Confirmatory Factor Analysis

Model	χ^2	df	p	RMSEA	SRMR	CFI	TLI
Control group	1529.28	708	.000	.054	.066	.889	.878
Positive message group	1640.52	708	.000	.057	.068	.879	.867
Negative message group	1517.24	708	.000	.053	.068	.897	.888

Note. CFI=comparative fit index; RMSEA=root mean square error of approximation; SRMR=standardized root mean square residual; TLI=Tucker-Lewis index.

DNs model was different in the treatment groups compared with the control group, both Hypotheses 1 and 2 were supported. Moreover, the constructs in which a difference was found were different in the case of the positive group than in the case of the negative group (notwithstanding that both showed a similar difference in *desire*). Therefore, Hypothesis 3 was supported too.

Discussion

This study set about uncovering why both positive and negative normative messages had similar effects on intention to be physically active despite conveying the opposite information (van Bavel et al., 2014). The influence of the negative normative message was of particular interest as it was more unexpected. The impact of the positive normative message on desire and in turn intention, by contrast, was something the literature on conformity to social norms would have led us to expect (Asch, 1951; Sherif, 1935).

The negative message group had higher values in the attitudes scale than the control group, whereas the positive message group did not. Those exposed to messages stating that most peers were not physically active believed *more strongly* that engaging in regular PA was—simply put—a good thing. This finding invited two different interpretations, both involving self-identity with regard to the target behavior (i.e., being physically active; Hagger & Chatzisarantis, 2008). The first was based on social identity theory's explanation for inter-group dynamics (Tajfel & Turner, 1986). Members of an in-group, when confronted with the out-group, will reassert their membership of the in-group by reaffirming its core values. As the message was tailored to the country, gender, and age of the respondents, in-group and out-group membership were not defined by demographics, but by behavior. Active people, when confronted with a message saying that the majority was not physically active, were effectively confronting the behavior of the out-group. As a reaction, they could be reaffirming their positive attitude toward PA, particularly those for whom PA strongly defined their self-identity. This effect on the more active subsample could have been large enough to affect the mean value of attitudes for the group as a whole.

The second explanation (complementary to the first) was based on deviance regulation theory (Blanton & Christie, 2003). In a nutshell, the theory posits that people

maintain desired views of themselves by regulating how they differ from others. When faced with the norms of the majority, they evaluate the desirability of the counter-normative choice (more so than the desirability of the normative choice) because it stands out from the perceptual ground and attracts attention. In the case of the negative message, a deviance regulation theory interpretation would suggest that because the desirability of the counternormative choice (namely being physically active) was high, respondents sought this self-identity. Espousing favorable attitudes toward PA was consistent with this self-identity. By contrast, in the positive message group, the counternormative self-identity (i.e., not being physically active) was comparatively less desirable, and therefore, did not elicit such favorable attitudes. These findings and interpretations will need to be tested in future research. To this end, studies could include self-identity with regard to PA as a variable and evaluate the overall desirability of being physically active (or not). This would allow for more nuanced analyses that could isolate the effects of social identity and the appeal of counternormative choices.

The second result of the study was that the positive message group showed higher values in positive anticipated emotions than the control group, whereas the negative message group did not. Being exposed to a message saying that most peers are physically active increased respondents' feelings of happiness, pride, and excitement at engaging in a PA they liked. These results are consistent with the literature on conformity to social norms (Asch, 1951; Sherif, 1935). If respondents perceive that "everybody is doing it," not only will they get a sense of satisfaction from doing a PA that they like, but also from conforming to the expectations of a reference group. This in turn increases the feelings of acceptance and inclusion by the group, which can lead to increased self-esteem (Leary & Downs, 1995).

The final result, that is, desire was higher in both treatment groups compared with the control group, confirms previous findings about the impact of the normative messages on intention (van Bavel et al., 2014). In the MGDB + DNs model, desire is the only factor affecting intention directly. Therefore, if intention was already shown to be positively affected by normative messages, it is not entirely unexpected that the sole factor presumed to have a direct impact on it be affected similarly.

A number of limitations apply to this study. First, the results were based on the self-reported replies to an

Table 2 Comparison of Means of Constructs Between Treatment Groups and Control

	Coefficients	Standard Error	Z	$p > z $	95% Confidence Interval	
Attitude						
Positive message group	.097	.062	1.564	.1182	−.025	.219
Negative message group	.176	.059	2.942	.003**	.059	.294
Descriptive norms						
Positive message group	.067	.112	.599	.549	−.153	.288
Negative message group	.072	.113	.638	.524	−.149	.293
Perceived behavioral control						
Positive message group	.063	.087	.719	.472	−.107	.233
Negative message group	.121	.085	1.424	.155	−.046	.288
Positive anticipated emotions						
Positive message group	.199	.071	2.788	.005**	.059	.339
Negative message group	.133	.076	1.738	.083	−.017	.283
Negative anticipated emotions						
Positive message group	−.114	.134	−.848	.397	−.378	.151
Negative message group	−.096	.138	−.691	.489	−.368	.176
Desire						
Positive message group	.268	.088	3.041	.003**	.095	.441
Negative message group	.187	.091	2.068	.039*	.009	.365
Intention						
Positive message group	.336	.109	3.107	.002**	.124	.548
Negative message group	.443	.108	4.096	.000**	.231	.656

Note. *Injunctive norms* did not have a significant effect on desire in treatment groups or control and are therefore not taken into account in the analysis of influence. Significance levels: * $p < .05$, ** $p < .01$.

online questionnaire. Therefore, all limitations of self-reported data-collection methods apply. Second, respondents' PA status could be an important aspect in explaining how normative messages influence PA intention, in particular because it would largely determine self-identity with regard to the target behavior. Future studies could further segment the sample according to PA status and look for differences in reactions to normative messages accordingly. Third, there was no follow-up measure of actual behavior. Instead, intention to behave was measured (during the survey). Although intention is presumed to capture the motivational forces that lead to behavior, and prior studies have established a moderate corrected meta-analytic correlation ($r = .48$, Hagger & Chatzisarantis, 2008), there is always a gap between intention and behavior. This was also not a longitudinal study, lacking a measure of intention before and after being exposed to the message. Finally, there was no baseline assessment or follow-up study to observe if people translated intention into behavior.

This paper may contribute to an understanding of how normative messages have an impact on behavioral intention. It also contributes to the literature on TPB and MGDB applied to PA. In particular, by applying an extension of TPB to an experimental study, it suggests a novel application of a theory that recently has been under

criticism (Sniehotta, Presseau, & Araújo-Soares, 2014). Finally, by targeting a population that is not WEIRD (Western, Educated, Industrialized, Rich, and Democratic), the study broadens the traditional empirical base of exercise psychology theories and concepts (Duda & Allison, 1990) and enhances the generalizability of social-cognitive-type theoretical constructs (Henrich, Heine, & Norenzayan, 2010).

Results showed that being exposed to positive normative messages resulted in stronger positive anticipated emotions, possibly due to the affective reaction at the prospect of conforming to social norms. They also suggested that being exposed to negative normative messages resulted in stronger positive attitudes toward PA—a finding that invites interpretations based on self-identity theory (Tajfel & Turner, 1986) and deviance regulation theory (Blanton & Christie, 2003).

Acknowledgments

We are grateful to Maite Bocanegra, Rosa Dalet, and Giuseppe Veltri for conducting the survey in the frame of the project *Health-Related ICT Use by Young People in Enlargement & Integration Countries* (JRC-SEV-2012-J03-28); to Patricia Farrer, Francisco Lupiáñez Villanueva, and Ioannis Maghiros for support; to Sandra Caldeira, Benedikt Hermann,

and Antonios Proestakis for initial guidance; and to all participants at the Joint Research Centre's workshop *Countering Obesity by Combining Behavioural Insights and Novel ICT Tools* in Varese, Italy (October 3–4, 2012) for their patience and advice.

Note

1. http://www.esomar.org/uploads/public/knowledge-and-standards/codes-and-guidelines/ESOMAR_Guideline-for-online-research.pdf.

References

- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11–39). Berlin, Heidelberg: Springer.
- Ajzen, I. (2015). The theory of planned behaviour is alive and well, and not ready to retire: A commentary on Sniehotka, Presseau, and Araújo-Soares. *Health Psychology Review*, 9(2), 131–137. PubMed doi:10.1080/17437199.2014.883474
- Asch, S.E. (1951). Effects of group pressure on the modification and distortion of judgements. In H. Guetzkow (Ed.), *Groups, leadership and men* (pp. 177–190). Pittsburgh PA: Carnegie Press.
- Baranowski, T., Beltran, A., Chen, T.-A., Thompson, D., O'Connor, T., Hughes, S., ... Baranowski, J. (2013) Psychometric assessment of scales for a model of goal directed vegetable parenting practices (MGDVPP). *International Journal of Behavioural Nutrition and Physical Activity*, 10, 110. doi:10.1186/1479-5868-10-110
- Blanton, H., & Christie, C. (2003) Deviance regulation: A theory of action and identity. *Review of General Psychology*, 7(2), 115–149. doi:10.1037/1089-2680.7.2.115
- Cialdini, R.B., Reno, R.R., & Kallgren, C.A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58, 1015–1026. doi:10.1037/0022-3514.58.6.1015
- Department of Health and Human Services. (2008). *2008 Physical activity guidelines for Americans*. Retrieved from <http://www.health.gov/paguidelines/guidelines/default.aspx>
- Downs, D., & Hausenblas, H.A. (2005). The theories of reasoned action and planned behavior applied to exercise: A meta-analytic update. *Journal of Physical Activity and Health*, 2, 76–97. doi:10.1123/jpah.2.1.76
- Duda, J.L., & Allison, M.T. (1990). Cross-cultural analysis in exercise and sport psychology: A void in the field. *Journal of Sport and Exercise Psychology*, 12(2), 114–131. doi:10.1123/jsep.12.2.114
- Esposito, G., van Bavel, R., Baranowski, T., & Duch-Brown, N. (2016). Applying the model of goal-directed behavior, including descriptive norms, to physical activity intentions: A contribution to improving the theory of planned behavior. *Psychological Reports*, 119(1), 5–26. PubMed doi:10.1177/0033294116649576
- European Commission (2006). *Health and Food*. Special Eurobarometer (Report No. 246). Retrieved from http://ec.europa.eu/health/ph_publication/eb_food_en.pdf
- Fitzgerald, A., Fitzgerald, N., & Aherne, C. (2012). Do peers matter? A review of peer and/or friends' influence on physical activity among American adolescents. *Journal of Adolescence*, 35, 941–958. PubMed doi:10.1016/j.adolescence.2012.01.002
- Gallagher, K.M., & Updegraff, J.A. (2012). Health message framing effects on attitudes, intentions and behavior: A meta-analytic review. *Annals of Behavioral Medicine*, 43, 101–116. PubMed doi:10.1007/s12160-011-9308-7
- Goldstein, N.J., Cialdini, R.B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, 35, 472–482. doi:10.1086/586910
- Hagger, M.S., Chatzisarantis, N., Biddle, S.J.H., & Orbell, S. (2001). Antecedents of children's physical activity intentions and behavior: Predictive validity and longitudinal effects. *Psychology and Health*, 16, 391–407. doi:10.1080/08870440108405515
- Hagger, M.S., & Chatzisarantis, N.L.D. (2008). Youth attitudes. In A.L. Smith & S.J.H. Biddle (Eds.), *Youth physical activity and sedentary behavior: Challenges and solutions*. Champaign, IL: Human Kinetics.
- Hagger, M.S., Chatzisarantis, N.L.D., & Biddle, S.J.H. (2002). A meta-analytic review of the theories of reasoned action and planned behaviour in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology*, 24, 3–32. doi:10.1123/jsep.24.1.3
- Hales, D., Evenson, K.R., Wen, F., & Wilcox, S. (2010) Postpartum physical activity: Measuring theory of planned behaviour constructs. *American Journal of Health Behaviour*, 34(4), 387–401. doi:10.5993/AJHB.34.4.1
- Henrich, J., Heine, S.J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2–3), 61–83. PubMed doi:10.1017/S0140525X0999152X
- Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. doi:10.1080/10705519909540118
- Huang, T.T., Harris, K.J., Lee, R.E., Nazir, N., Born, W., & Kaur, H. (2003). Assessing overweight, obesity, diet, and physical activity in college students. *Journal of American College Health*, 52, 83–86. PubMed doi:10.1080/07448480309595728
- Humbert, M.L., Chad, K.E., Spink, K.S., Muhajarine, N., Anderson, K.D., Bruner, M.W., ... Gryba, C.R. (2006). Factors that influence physical activity participation among high- and low-SES youth. *Qualitative Health Research*, 16, 467–483. PubMed doi:10.1177/1049732305286051
- Jackson, C., Smith, A., & Conner, M. (2003). Applying an extended version of the theory of planned behaviour to physical activity. *Journal of Sports Sciences*, 21(2), 119–133. PubMed doi:10.1080/0264041031000070976

- Kahneman, D. (2011). *Thinking, fast and slow*. London, UK: Penguin.
- Latimer, A.E., Rench, T.A., Rivers, S.E., Katulak, N.A., Materese, S.A., Cadmus, L., ... Salovey, P. (2008). Promoting participation in physical activity using framed messages: An application of prospect theory. *British Journal of Health Psychology*, 13, 659–681. PubMed doi:10.1348/135910707X246186
- Lazuras, L., Ourda, D., Barkoukis, V., & Tsorbatzoudis, H. (2011). A study of predictors of adolescents' physical activity intentions. *Psychology, Society and Education*, 3(2), 69–81.
- Leary, M.R., & Downs, D.L. (1995). Interpersonal functions of the self-esteem motive: The self-esteem system as a sociometer. In M.H. Kernis (Ed.), *Efficacy, agency, and self-esteem* (pp. 123–144). New York, NY: Plenum.
- Montano, D.E., & Kasprzyk, D. (2015). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In K. Glanz, B.K. Rimer, & K. Viswanath, (Eds.), *Health behavior: Theory, research and practice*. San Francisco, CA: Jossey-Bass.
- Perugini, M., & Bagozzi, R.P. (2001). The role of desires and anticipated emotions in goal-directed behaviours: Broadening and deepening the theory of planned behaviour. *British Journal of Social Psychology*, 40, 79–98. PubMed doi:10.1348/014466601164704
- Perugini, M., & Conner, M. (2000) Predicting and understanding behavioral volitions: The interplay between goals and behaviors. *European Journal of Social Psychology*, 30, 705–731. doi:10.1002/1099-0992(200009/10)30:5<705::AID-EJSP18>3.0.CO;2-#
- Poobalan, A.S., Aucott, L.S., Clarke, A., & Smith, W.C.S. (2012). Physical activity attitudes, intentions and behaviour among 18–25 year olds: A mixed method study. *BMC Public Health*, 12, 640. PubMed doi:10.1186/1471-2458-12-640
- Priebe, C.S., & Spink, K.S. (2011). When in Rome: Descriptive norms and physical activity. *Psychology of Sport and Exercise*, 12, 93–98. doi:10.1016/j.psychsport.2010.09.001
- Priebe, C.S., & Spink, K.S. (2012). Using messages promoting descriptive norms to increase physical activity. *Health Communication*, 27(3), 284–291. PubMed doi:10.1080/10410236.2011.585448
- Randolph, W., & Viswanath, K. (2004). Lessons learned from public health mass media campaigns: Marketing health in a crowded media world. *Annual Review of Public Health*, 25, 419–437. PubMed doi:10.1146/annurev.publhealth.25.101802.123046
- Rivis, A., & Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology: Developmental, Learning, Personality, Social*, 22(3), 218–233. doi:10.1007/s12144-003-1018-2
- Sherif, M. (1935). A study of some social factors in perception. *Archives of Psychology*, 27(187), 23–46.
- Slaunwhite, J.M., Smith, S.M., Fleming, M.T., & Fabrigar, L.R. (2009). Using normative messages to increase healthy behaviours. *International Journal of Workplace Health Management*, 2(3), 231–244. doi:10.1108/17538350910993421
- Snihotta, F.F., Pesseau, J., & Araújo-Soares, V. (2014) Time to retire the theory of planned behaviour. *Health Psychology Review*, 8(1), 1–7. PubMed doi:10.1080/17437199.2013.869710
- Spink, K.S., Crozier, A.J., & Robinson, B. (2013). Examining the relationship between descriptive norms and perceived effort in adolescent athletes: Effects of different reference groups. *Psychology of Sport and Exercise*, 14, 813–818. doi:10.1016/j.psychsport.2013.06.006
- Tajfel, H., & Turner, J.C. (1986). The social identity theory of intergroup relations. In S. Worchel and W.G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Monterey, CA: Brooks/Cole.
- Taylor, S.D., Bagozzi, R.P., & Gaither, C.A. (2005) Decision making and effort in the self-regulation of hypertension: Testing two competing theories. *British Journal of Health Psychology*, 10, 505–530. PubMed doi:10.1348/135910704X22376
- van Bavel, R., Esposito, G., & Baranowski, T. (2014). Is anybody doing it? An experimental study of the effect of normative messages on intention to do physical activity. *BMC Public Health*, 14(1), 778. doi:10.1186/1471-2458-14-778
- World Health Organization. (2009). *Evaluation of public health services in south-eastern Europe*. Copenhagen, Denmark: WHO Regional Office for Europe.
- World Health Organization. (2010). Global recommendations of physical activity for health. Retrieved from http://www.who.int/dietphysicalactivity/factsheet_recommendations/en