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Functional effectiveness of threat appeals in exercise promotion messages

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As more than 70% of individuals in Western societies can be categorized as sedentary and inactivity has been recognized to lead to a series of serious physical and psychological disorders, the importance of physical activity promotion is ever more emphasized. Many social marketing campaigns use threat (or fear) appeals to promote healthy behaviors. Theoretical models, such as the Extended Parallel Process Model integrate concepts as 'perceived threat' and 'perceived efficacy' to explain how such messages operate and can cause diverse behavioral reactions. It is however still not entirely clear how these different aspects are valuated and combined to determine desired versus undesired response behaviors in individuals. In a functional integration task, threat-appeal based exercise promotion messages varying in psychological threat and efficacy content were shown to sedentary employees in order to assess how they affect their intention to engage in physical exercise. Our results show that individuals can be categorized in 4 different clusters depending on the way they valuate threat and efficacy appeals: i.e. individuals sensitive to both types of cues, those sensitive to either the threat or the efficacy component in the message and those insensitive to either one of them. As different segments of receivers of the message react differently to threat and efficacy combinations, it is concluded that different approaches to designing effective mass media campaigns may be required for effective exercise promotion.

INTRODUCTION

In this paper we will address the problem that too many people do not have enough exercise as a consequence of their sedentary lifestyle and the dangers this brings along. While mass media campaigns are an important first step in raising awareness about physical activity and health in the general community, the effectiveness of such campaigns is unclear and sometimes questioned.

As more theory driven approaches are called for to enhance the impact of such campaigns, we will review some theoretical models regarding threat (or fear) appeals, which are often used in social marketing campaigns to promote healthy behavior. We will focus especially on Witte's

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(1992) '*Extended Parallel Process Model*', which integrates concepts as '*perceived threat*' and '*perceived efficacy*' to explain how these messages operate and can cause diverse reactions such as '*danger control*' (leading to compliance) or '*fear control*' (leading to dismissal of the recommended response).

As it is still not entirely clear how the different elements of a threat appeal message combine exactly to determine desired versus undesired response behaviors in individuals, the current research will use Information Integration Theory (IIT; Anderson, 1981, 1982) to examine how 'threat' and 'efficacy' elements in exercise promotion messages are valuated and integrated to determine respondents' intentions to take on a more active lifestyle.

In section 2, 3 and 4, a short literature overview will be given to situate the research objective of this research. Section 2 gives an overview of the problem situation, section three of the existing research results on the effectiveness of threat appeals. Section 4 shows our research objective. Next, a new approach to tackle these research questions will be proposed (section 5). In section 6, the way this research method has been applied to this pilot study is explained and the results are given in section 7. A discussion on these results (section 8) and a conclusion (section 9) close this paper.

SEDENTARY LIFESTYLE AND NEED FOR EXERCISE PROMOTION

The World Health Organization alerts that at least 60% of the world population does not succeed in having enough daily physical activity (2009a). An explanation for this lack of activity can be found in a growing number of people engaged in sedentary occupational and domestic work (Jans, Proper & Hildebrandt, 2007). In Western societies, even more than 70% of individuals have to be categorized as 'sedentary' (World Health Organization, 2009b). Not only is a large amount of the working population less physically active during their daily paid and household tasks, also during their leisure time people are less involved with physical activity. The range of possibilities to spend ones spare time in an inactive way (e.g., watching television, playing videogames, personal computing,...), has grown profoundly, with detrimental consequences (Andersen, Crespo, & Cheskin, 1998). As a matter of fact such inactivity has been acknowledged to lead to a series of serious physical and psychological disorders (World Health Organization, 2009b). A minimum of 30 minutes of physical exercise, 5 days a week, along with other healthy behaviors like high-quality nutrition, are necessary to pursue a healthy lifestyle and avoid having serious diseases as strokes, type 2 diabetes, colon cancer, cardiovascular problems, obesity,… (Hillsdon, Thorogood, White & Foster, 2002; Hu, Li,

Colditz, Willett, & Manson, 2003; Berry, 2006; Plotnikoff, 2006) and mental problems like lack of self-esteem, depression, psychological dysfunction, cognitive malfunctioning,... (Biddle, Fox, & Boutcher, 2000). The benefits of an adequate amount of physical activity are manifold; among many other benefits physical activity has a positive effect on hypertension, osteoporosis, body weight, musculoskeletal conditions, decreasing depression, anxiety and stress (World Health Organization, 2009b).

As inactivity has been recognized to have harmful physical as well as physiological effects (World Health Organization, 2009b), the importance of physical activity promotion is ever more emphasized (MacAuley, 1993; Plotnikoff, 2006). While mass media campaigns are an important first step in raising awareness about physical activity and health in the general community (Booth, Bauman, Oldenburg, & Magnus, 1992; Kahn et al. 2002; Bauman, Smith, Maibach & Reger-Nash, 2006), the effectiveness of such campaigns is unclear (Kahn et al., 2002) and sometimes questioned (Hillsdon et al. 2002; Berry, 2006). More theory driven approaches are called for to enhance their impact (Plotnikoff, 2006).

THREAT APPEALS AND THEIR EFFECTIVENESS

One of the most frequently used message tactics in mass media campaigns promoting health behavior change are threat or fear appeals (Wong, 2009). Threat appeals are often used in social marketing campaigns to inform people about a possible health risk and to convince them into ending undesired behavior (Roskos-Ewoldsen, Yu & Rhodes, 2004, Henley & Donovan, 2002). By describing the negative consequences of certain risk full actions, e.g., lung cancer for smokers, car-accidents because of reckless driving, social disapproval caused by obesity, getting HIV/AIDS because of having sex without preservatives,… social marketers aim to scare people into doing what the message prescribes (Witte, 1992). While numerous academics have proposed different theories to explain the process through which threat appeals motivate behavior change (Hovland, Janis & Kelly, 1953; Janis, 1967; Leventhal, 1971; Rogers, 1975), the underlying theoretical framework for this study will be the '*Extended Parallel Process Model'* (EPPM) presented by Witte (1992, 1994), as it integrates various previous theories in order to explain when and why threat appeals are effective and why they sometimes fail.

According to Witte's '*Extended Parallel Process Model'* (EPPM), which integrates Leventhal's (1971) '*Parallel Process Model*' and Roger's (1975) '*Protection Motivation Theory*', two parallel message appraisals occur when someone is exposed to a threat appeal message: (1) '*threat appraisal'* and (2) '*efficacy appraisal*'.

1. '*Threat appraisal*' involves the assessment of (a) the '*severity*' of the threat (i.e. how severe are the negative consequences) and (b) the

'*susceptibility*' to the threat (i.e. how vulnerable am I to this threat). Someone has to perceive the threat as severe and to be at risk in order for the threat appeal to produce the necessary fear to motivate action.

2. *'Efficacy appraisal'* involves the assessment of (c) *'response efficacy'* (i.e. the belief that the recommended behavior is actually effective to avert the threat) and (d) *'self-efficacy'* (i.e. the belief to be able to perform the recommended behavior).

The EPPM (Witte, 1992, 1994) argues that threat appeals can have three different effects based on these two message appraisals: a null effect, an intended effect (i.e. '*danger control*') or an unintended effect (i.e. '*fear control*'). When perceived threat is low, threat appeals are assumed to have no effect on behavioral change. In this case people are not motivated to perform the recommended behavior because they do not feel the health risk is serious or personally relevant. If the message fails to evoke at least some moderate threat, Witte (1994) argues that it will not even motivate people to move on to the second step of 'efficacy appraisal'. On the other hand, when perceived threat is high, the ultimate response to the threat appeal will depend on the '*assessment of efficacy'*. In case perceived efficacy is high, people will engage in '*danger control*' (i.e. attempting to control the threat by performing the recommended behavior as intended by the sender of the message). In case perceived efficacy is low, however, people will try to manage their fear by engaging in an unintended maladaptive response: *'fear control'* (i.e. alleviating the fear by denial of the threat). Hence, as fear causes a negative emotional state, the person experiencing this emotion wants to neutralize this feeling by either coping with the risk and following the recommended behavior (i.e. cognitive reaction / danger control) or by reacting defensively and denying the potential problem (i.e. emotional reaction / fear control) (Tanner, Hunt & Eppright, 1991). The proposed danger has to be experienced as relevant and the recommended behavior will only reduce the threat if it is seen as effective (Das, de Wit & Stroebe, 2003). This is in line with Leventhal's '*Parallel Process Model*' (1971: p.1211) which states that when one considers the threat cognitively as relevant and the recommendation as effective he or she will take control of the danger. On the contrary, when one experiences fear, but does not find him- or herself able to behave as stipulated or does not consider the recommendation adequate, a process of fear control will set in motion and the person will react emotionally by denying the threat or act defensively.

Previously, Janis (1967) claimed the relation between the aroused fear after seeing the risk message and accepting the proposed recommendation to follow an inverted U shaped pattern, indicating that a certain level of fear is needed to arouse motivation to read the message and evaluate and consider the recommended change in behavior. However, if the receiver of the risk message experiences too overwhelming fear emotions, defensive and

avoidance reactions are assumed to take place and no behavioral change will occur (Arthur & Quester, 2004). Rogers (1975) '*Protection Motivation Theory*' specified the circumstances under which a respondent would either control the faced danger or control only the fear and deny the underlying problem causing these emotions. Rogers (1975) argued that a danger control process is only possible when the threat message effectively incorporates each of the previously mentioned four components: (a) severity, (b) susceptibility, (c) response-efficacy and (d) self-efficacy. He argues that an individual could only successfully protect himself from the perceived threat when each of these four components is high and only in that condition will he undertake the prescribed action. Witte (1992) argues that it is possible, nonetheless, that all these components are met and that people still keep up with their maladaptive behavior. This is the case when the reward of this behavior is perceived as greater than the severity or the susceptibility of the threat.

While different meta-analyses on the subject agree that the stronger the threat appeal, the greater the attitude, intention and behavior change (Boster & Bostrom, 1984; Mongeau, 1998; Sutton, 1982; Witte and Allen, 2000), the meta-analysis by Witte and Allen (2000), which synthesized more than 100 threat-appeal articles, provides evidence that strong threat appeals with high-efficacy messages produce the greatest behavior change, whereas strong threat appeals with low-efficacy messages appear to produce the greatest levels of undesired defensive responses. With this review-study Witte & Allen (2000) found empirical support for the '*Extended Parallel Process Model*' and for the fact that the four message components, namely: severity, susceptibility, response-efficacy and self-efficacy produce positive persuasive effects (p. 602-603).

RESEARCH OBJECTIVE

While an important body of research on the possible outcomes of combinations of threat and efficacy elements in threat appeal messages has already accumulated (see Boster & Bostrom, 1984; Mongeau, 1998; Sutton, 1982; Witte & Allen, 2000, Rimal, 2001; Rimal & Real, 2003; Rimal et al., 2009), it is still rather unclear *in which way* these different elements combine to elicit different kinds of responses. Understanding how these processes take place cognitively as well as uncovering potential individual differences may substantially increase our understanding on how promotional messages should be constructed to effectively prompt a desired behavioral response. The current pilot study aims to explore how Information Integration Theory (Anderson, 1981, 1982) and Functional Measurement can shed some light on these underlying threat-message elaboration processes.

FUNCTIONAL MEASUREMENT OF THREAT AND EFFICACY APPRAISALS

Information Integration Theory (Anderson, 1981, 1982, 1996, 2001, 2009) and its methodological counterpart Functional Measurement (FM) offer a theoretical and methodological framework to investigate how people integrate internal representations of simultaneously presented observable stimuli into a single subjective observable response. The FM paradigm depicted in Figure 1 describes this sequence.

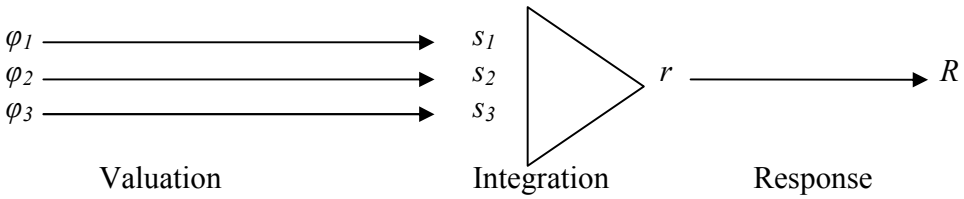


Figure 1: Functional Measurement paradigm (Anderson, 1981; Weiss, 2006) where φ_n are the observable stimuli, s_n, the subjective stimuli, r the subjective response and R the observed response.

A set of observable stimuli possess information which through the process of '*Valuation'* yield psychological representations (subjective intensities). These representations are then combined into a single implicit response r through the process of psychological '*Integration'*. Finally, the result of the integration is translated in an observable response R by the '*Response'* function (Anderson, 1981, Weiss, 2006).

By varying the factors (φ_n) across different intensity levels in a factorial judgment task, the 'Valuation', 'Integration' and 'Response' functions can be assessed. First, the observable stimulus levels must be valuated in such a way that they generate different psychological representations for each factor. Then, if an integration of different stimulus representations takes place, previous empirical research (for a review see Anderson, 1996, 2009) has shown that, in most cases, three algebraic rules will approximate internal integration functions: an '*addition'* rule, a '*multiplication'* rule, and an '*averaging'* rule. Each integration rule predicts a specific pattern in the data if the observable response is a linear transformation of the internal response pattern. When data are plotted in a factorial graph, an '*additive integration rule'* predicts a set of parallel lines. Statistically this is confirmed with significant main effects and a non-significant interaction. '*Equal weights averaging'* produces a similar pattern of parallelism, but when responses from subdesigns are included (i.e. judgments of messages where only the threat aspect is presented uncombined with efficacy aspects) the curve representing these data violates this pattern of parallelism ideally with a clear cross-over. Statistically, the

interaction term should be found to be significant. A '*multiplicative integration*' predicts a somewhat different pattern. When plotted adequately (i.e. using marginal means spacing on the *X*-axis), the factorial graph reveals a set of lines diverging from a common point, producing a pattern know as the *linear fan* (Anderson, 1981; Weiss, 2006). Statistically, the multiplicative rule is supported by significant main effects and a significant interaction, but where the multiplicative relation is specifically apparent from a significant bilinear component and a nonsignificant residual interaction component.

All three integration rules differ qualitatively with respect to the interpretation of the data. An '*additive integration rule*' implies that the different stimuli each contribute their values independently to a cognitive sum (Rundall & Weiss, 1994). With respect to the observable response this means that a large internal value in either factor will elicit a large observable response, and that the response from a combination of the stimuli will always produce a larger response than if originating from a single stimulus component. On the other hand, an '*averaging integration rule*' implies that adding extra stimulus information from a factor may produce a response smaller than the sum of the single subjective values of both factors or a response even smaller than the subjective value of a stimulus from one factor. Responses can thus be *averaged down* when stimuli are presented combined as opposed to when presented separately. With respect to a '*multiplicative rule*', all factors must have high subjective values in order to produce a high response. Put differently, as opposed to an additive integration, a factor from a multiplicative integration model cannot really compensate for very low stimulus values on either one of them.

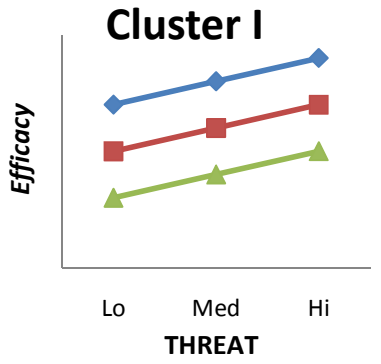
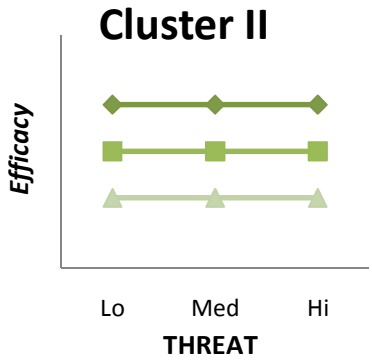
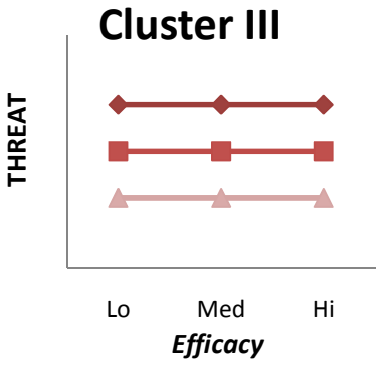
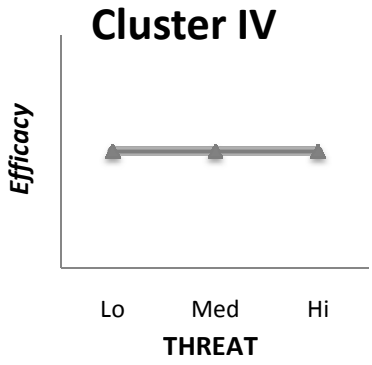
Finally, observing either one of the previously described integration patterns in the data simultaneously validates the Integration rule and the linearity of the Response function. Otherwise, any nonlinearity in the response scale would violate the predicted patterns of parallelism or the linear fan, given of course that the integration model holds (Anderson, 1981, 1982).

As it is still not entirely clear how different elements of a threat appeal message combine exactly to determine desired versus undesired response behaviors, the current research aims to apply IIT (Anderson, 1981, 1982) in order to examine how 'threat' and 'efficacy' elements in exercise promotion messages are valuated and integrated to determine respondents' intentions to exercise more.

The concept of threat and efficacy appraisals in the EPPM (Witte, 1992, 1994) can be translated in IIT-based predictions of data patterns according to the subjects' *valuation* of message components. The valuation operation in IIT allows for an idiographic approach to the problem, taking into account the characteristics that make one individual different from

another (Anderson, 1996). With respect to the present study this implies that, when subjects are submitted to a factorial judgment task of exercise promotion messages varying in intensities of threat and efficacy, an effect on both, none or either one of these components will be observable in the data depending on how subjects valuate these components. Based on these qualitative differences in valuation respondents may be categorized in different clusters according to their sensitivity to different types of exercise promotion messages. Table 1 provides an overview of such clusters and their corresponding predicted factorial graphs.

Table 1. Predicted data patterns according to differences in threat and efficacy sensitivity.

	High threat sensitivity	**Low threat sensitivity**
High efficacy sensitivity		
Low efficacy sensitivity		

Respondents in **Cluster I** are alleged to be sensitive to both threat and efficacy components in exercise promotion messages. Various intensities of threat and efficacy components will generate different subjective values within each factor in these respondents. If the difference between these values is sufficiently large, main effects of both threat and efficacy will be observable in the data. On the other hand, no specific predictions about the operating integration rule can be made, as Witte's

theory focuses more on valuation and outcome than on integration per se. For the sake of clarity, an additive integration rule is assumed in Table 1, but multiplicative or averaging integration rules may apply as well in this particular cluster. As explained in the previous paragraphs this would generate other visuals and statistical predictions.

Respondents in **Cluster II** are assumed to demonstrate high efficacy sensitivity, but will be less responsive to the threat component in fear appeal messages. Translated in terms of IIT, respondents in this cluster are expected to valuate various intensities of the efficacy component differently, while the various intensity levels of the threat component are assumed to be valuated the same. This implies that only an effect of efficacy may be observed in the data from respondents belonging to this cluster. In factorial graphs with efficacy as curve parameter, a set of parallel horizontal lines is expected. Statistically, we expect a significant main effect of efficacy and a nonsignificant main effect of threat along a nonsignificant interaction term.

In **Cluster III**, respondents are expected to demonstrate high threat susceptibility along with low efficacy sensitivity. Various intensities of the threat and efficacy components are anticipated to be valuated in such a way that only an effect of threat will be observed in the data. In the factorial graphs with threat as curve parameter, the absence of a valuation effect from the efficacy component will be translated in a set of parallel horizontal curves. Statistically, only a significant main effect of threat will be observed in the ANOVA, while the main effect of efficacy and the interaction effect are expected to be nonsignificant.

Respondents in **Cluster IV** are presumed neither to be sensitive to threat nor efficacy manipulations in fear appeal messages. Visually, this implies a set of concurrent horizontal lines in the factorial graph and statistically this will be confirmed through nonsignificant main effects on neither of both factors nor in the interaction term.

Finally, it is important to note that the translation of Witte's EPPM into an IIT-based categorization of respondents does not entail any prediction of which cluster of respondents will actually perform the intended behavior (=behavioral outcome). Our classification is based upon the effect different manipulations of message components have on the *intention* to behave as recommended (=cognitive process). Put differently, while an effect of variations of threat and/or efficacy components in the message may be observed in respondents, this does not necessarily mean that the recommended behavior will actually occur and vice versa. It simply means that manipulation of intensities of these message components will affect the intention to behave as recommended. Therefore, depending on the level of baseline valuation of each component, actual change in behavior may be expected in each cluster.

RESEARCH METHOD

Participants. Thirty volunteers (13 males and 17 females, M age= 31.43 yrs, SD= 10.49) performed a judgment task regarding exercise intention. The main inclusion criterion was performing a sedentary job. Participants were rewarded for participation with either a book ("Start to Run/Swim/Bike" – Evy Gruyaert) or 2 cinema tickets.

Stimuli and design. Threat appeal-based exercise promotion messages were developed targeted towards sedentary employees, representing different degrees of '*threat*' and different degrees of '*efficacy*' in the message. Threat and efficacy factors were varied along three levels: low, medium and high. An overview of the textual information used as stimuli is provided in Table 2.

The presented '*threat*' was of a psychological nature and selected levels concerned increased stress and concentration problems (i.e. low), insomnia (i.e. medium) and chronic depression (i.e. high). Since there exists a causal relationship between the appraisal of stress, the perceived lack of control over stressful events and the enhanced vulnerability to insomnia (Morin, Rodrigue & Ivers, 2003) and between insomnia as an indicator of a greater risk for subsequent depression (Chang, Ford, Mead, Cooper-Patrick, & Klag, 1997) we deem this division into successive levels of threat as justified. Moreover, to give a clear indication to the respondents of the severity of each of these inactivity-based consequences, it was added that suffering from this 'threat' generally causes employees to be ill more often (with the number of sick days a year brought about by the corresponding threat varying from 7, over 12 to 20).

The levels of '*efficacy*' incorporated in the message involved receiving a newsletter with exercise recommendations (i.e. low), free exercise classes (i.e. medium) and the availability of a personal coach (i.e. high).

For each stimulus-combination, a fictitious poster was created based on the university's visual corporate identity (see Figure 2). A total of 15 posters represented the 3×3 full-factorial design and both one-way sub designs. The motivational text "*Exercise more!*" was kept constant for all stimulus combinations.

Table 2: Overview of the textual information used in the advertisements

Factor	Level	Stimulus description
Threat	*Low*	*"A lack of exercise leads to psychological problems such as increased stress and concentration problems. Individuals with increased stress and concentration problems are about 7 days a year more ill than healthy individuals."*
	Medium	*"A lack of exercise leads to psychological problems such as insomnia. Individuals suffering from insomnia are about 12 days a year more ill than healthy individuals."*
	High	*"A lack of exercise leads to psychological problems such as chronic depression. Individuals suffering from chronic depression are about 20 days a year more ill than healthy individuals and have a higher risk of suicide."*
Efficacy	*Low*	*"You can remedy this psychological discomfort with our weekly e-newsletter full of exercise recommendations!"*
	Medium	*"You can remedy this psychological discomfort with our Zumba, cycling and/or Bodycombat group classes, offered for free by the V.U.B. and Healthcity!"*
	High	*"You can remedy this psychological discomfort via personal training schedules from our personal coach offered by the V.U.B. and Healthcity!"*

Figure 2: Stimulus presentation (low threat; medium efficacy).

Procedure. The experiment was designed using FM BUILDER, a JAVA-based software program developed to conduct judgment experiments using text and image stimuli (Mairesse, Hofmans & Theuns, 2008). In view of the fact that our research focuses on the unhealthy consequences of a sedentary lifestyle due primarily to a sedentary job, participants were approached directly at their office by the second author (BW) and performed the task on their work spot on a notebook computer or they received an email during office hours at their business address, containing an attachment with the software, along with instructions on how to install the experiment and how to perform the judgment task.

First, participants were asked to input some biographical data and to answer 5 questions: (1) "*How much time do you spend weekly performing physical activities (walking, jogging, cycling,...)?*", (2) "*In your opinion, how much time should someone performing a sedentary job spend exercising weekly?*", (3) *"Do you perform a sedentary job?*", (4) "*Do you have any complaints due to your sedentary lifestyle or lack of exercise and if so, which complaints?*" and (5) *"If you exercise less than you think you should, what is the primary reason for that?"*.

Subsequently, a judgment task was presented, where participants were instructed to evaluate their willingness to engage in physical exercise based on randomly presented combinations of information on threat and efficacy. When presented with stimuli from reduced designs, participants were requested to convey their judgment based only on the stimulus appearing on screen (thus ignoring the influence of the other factor). Participants first performed a short trial run in order to familiarize them with the procedure. After that, the total set of 15 stimuli was presented twice in random order. For each exercise promotion message participants were required to answer the following question: *"Could this ad urge you to engage in physical exercise?"* Responses were conveyed by means of a 100-point label-anchored visual analogue scale presented in the middle of the screen, taking 80% of the screen width. The labels "No, certainly not", "Rather not", "Yes and no", "Rather yes" and "Yes, certainly" were spread along the slider at equal distances. In order to minimize non-compliance to the experiment (i.e. by skipping through the trials) a 1-second delay was built in before the appearance of the next-button. After completion of the judgment task, participants had to indicate whether they preferred the exercise book or cinema tickets as incentive. The whole procedure took about 20 minutes.

RESULTS

As expected, visual and statistical single-subject analyses revealed that all participants could be categorized in 4 main clusters depending on their appraisal of and sensitivity to threat and efficacy components in threat appeal-based exercise promotion messages. Each of the 4 clusters is reviewed more thoroughly in the sections below.

Cluster I. Single-subject analyses revealed an effect of threat and efficacy in 4 subjects. Figure 3 shows the 4 individual factorial graphs. A pattern of near parallelism is found for participant A, suggesting that manipulations of both threat and efficacy are valuated differently and integrated according to a rule closely related to additivity. These results are corroborated statistically with significant main effects of threat and efficacy and a nonsignificant interaction (see Table 3). The patterns observed in participants B and C are somewhat more complex. Visually, both graphs clearly suggest a valuation effect of both threat and efficacy and an averaging integration with differential weights. However, these results are not supported statistically as none of the sources is found to be significant. A possible explanation for these results is the occurrence of mutually compensating stimulus values within each factor causing the ANOVA to fail in detecting main effects. A similar phenomenon has been observed elsewhere (see Mairesse, Hofmans, De Valck, Cluydts & Theuns, 2007). Finally, the data of participant D suggest that threat and efficacy manipulations in exercise promotion messages are valuated differently and

integrated according to a multiplicative rule. The factorial graph in the bottom right panel of Figure 3 clearly shows a linear fan. This result is supported statistically by significant main effects of threat and efficacy, a significant bilinear interaction component and a nonsignificant residual interaction (see Table 3).

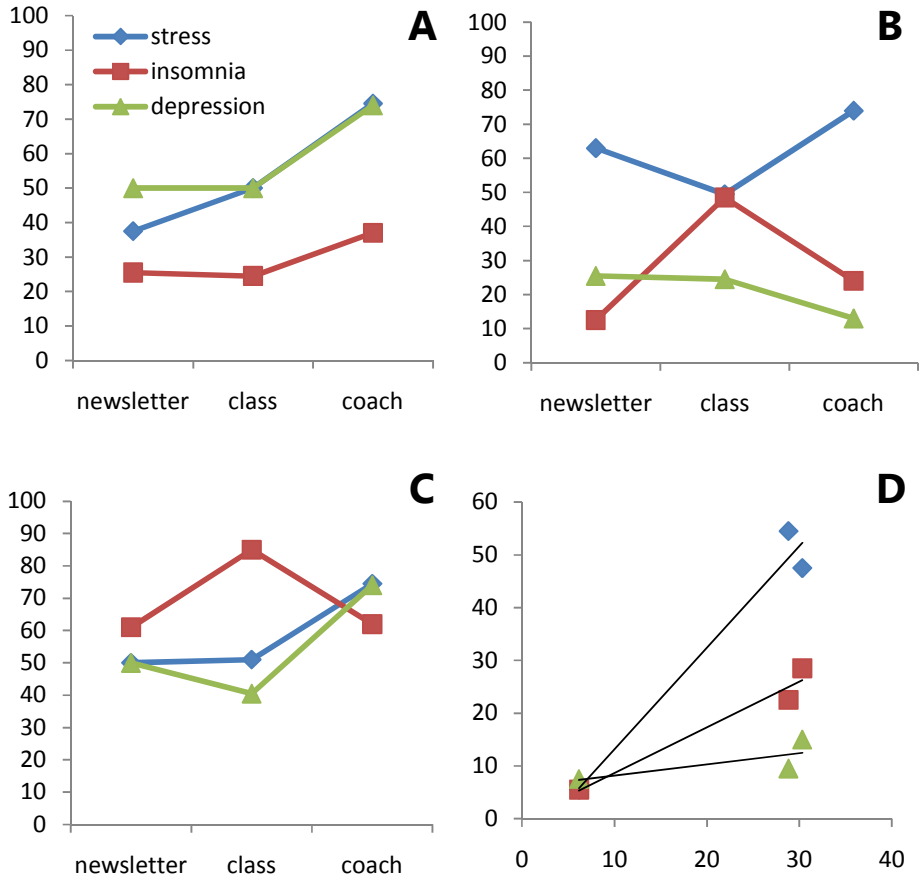


Figure 3: Individual factorial graphs of threat × efficacy. The X-axis represents efficacy-levels, the Y-axis the exercise intention with respect to levels of threat for the graphs of participants A, B and C. For participant D (multiplicative integration), the Y-axis represents the exercise intention with respect to levels of threat. The X-axis is spaced along the marginal means of the threat factor (functional scale) to reveal the linear fan pattern.

Table 3: Single-subject ANOVA results for participants belonging to Cluster I.

Source	Participant A	Participant B
Efficacy:	$F(2,9)=13.97$, $p= .002$	$F(2,9)= .099$, $p= .906$
Threat:	$F(2,9)=20.46$, $p< .001$	$F(2,9)= 3.72$, $p= .066$
Efficacy × Threat:	$F(4,9)= 1.22$, $p= .368$	$F(4,9)= .641$, $p= .648$
	Participant C	**Participant D**
Efficacy:	$F(2,9)= .434$, $p= .665$	$F(2,9)=30.18$, $p< .001$
Threat:	$F(2,9)= .346$, $p= .720$	$F(2,9)=27.14$, $p< .001$
Efficacy × Threat:	$F(4,9)= .468$, $p= .760$	$F(4,9)= 8.50$, $p= .004$
Bilinear interaction:		$F(1,9)=29.84$, $p< .001$
Residual interaction		$F(3,9)= 1.38$, $p= .309$

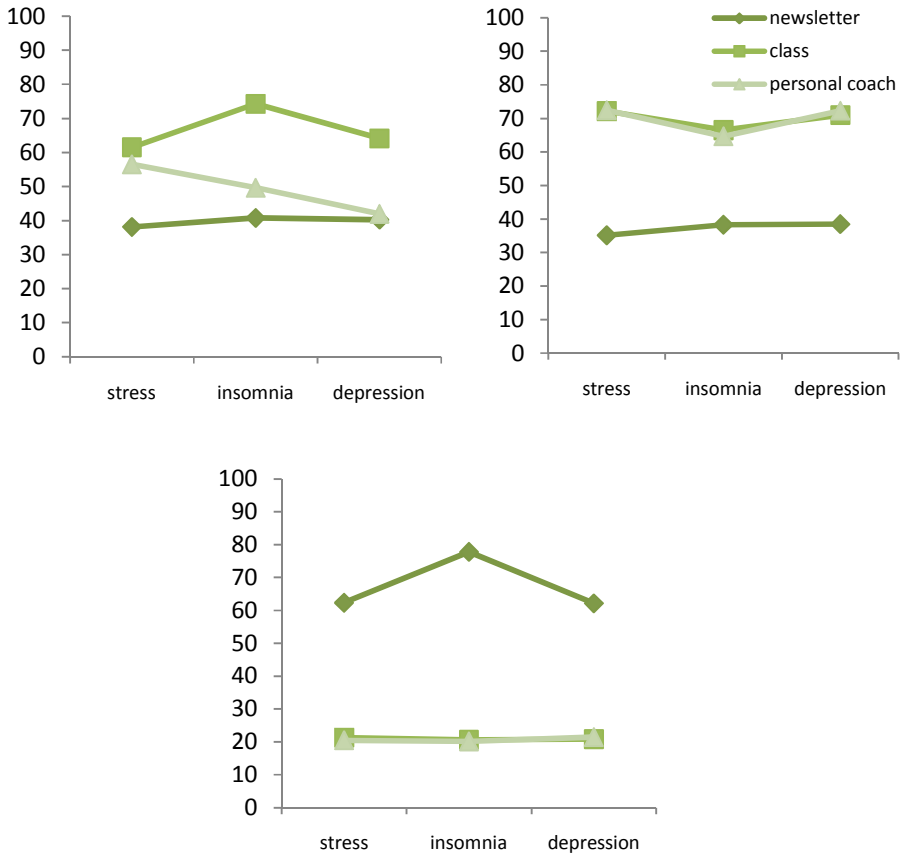


Figure 4: Factorial graph of efficacy × threat averaged over participants. The X-axis represents threat levels, the Y-axis the exercise intention with respect to efficacy levels.

Cluster II. Single-subject analyses revealed a group of 10 participants expressing an intention to exercise influenced mainly by a manipulation of efficacy-levels. However, as opposed to a general consensus of stimulus-order, individuals in Cluster II display three distinct sub-patterns. Figure 4 displays these results.

The left panel of Figure 4 represents pooled data of participants mainly influenced by free classes (n= 4). Statistically, this pattern is supported by a significant effect of efficacy (F[2,6]=23.13, p= .002), and a non-significant interaction (F[4,12=2.37, p= .11) and threat (F[2,6]=1.39, p= .319). The middle panel represents pooled data from 3 participants influenced by free classes and the presence of a personal coach. These results are corroborated statistically by a large significant efficacy effect (F[2,4]=300.05, p< .001), a non-significant interaction (F[4,8]=2.08, p= .176) and a non-significant effect of threat (F[2,4]=3.3, p= .143). The right panel displays data averaged over 3 participants being influenced only by a newsletter promoting physical exercise (top curve of the right panel). An "efficacy-only" valuation is supported by a large efficacy effect (F[2,4]=60.92, p= .002) along with a non-significant interaction (F[4,8]= .39, p= .812) and non-significant effect of threat (F[2,4]= .312, p= .75).

Cluster III. Visual inspection of single-subject factorial graphs revealed a set of parallel horizontal curves with threat-level as curve parameter in 10 subjects. Figure 5 shows the factorial graph of the pooled data in Cluster III. This pattern of "threat-only" valuation is supported statistically by a non-significant interaction term (F[4,36]=2.11, p= .099), no main effect for efficacy (F[2,18]=1.63, p= .223) and a significant main effect of threat (F[2,18]=5.15, p= .017).

It should be noted that the "stress" level of threat, alleged to be the lowest threat level, appears to generate the highest level of exercise intention.

Cluster IV. Visually, a pattern of both low threat and efficacy valuation is characterized by a set of concurrent parallel curves, horizontal with the X-axis of the factorial graph. Such a pattern is observed in 6 subjects and summarized in Figure 6. The results of the REPANOVA support these findings statistically, as none of the main effects or the interaction effect are statistically significant: efficacy: (F[2,10]= .32, p= .737); threat: (F[2,10]= 1.29, p= .318) and interaction: (F[4,20]= 1.68, p= .194)).

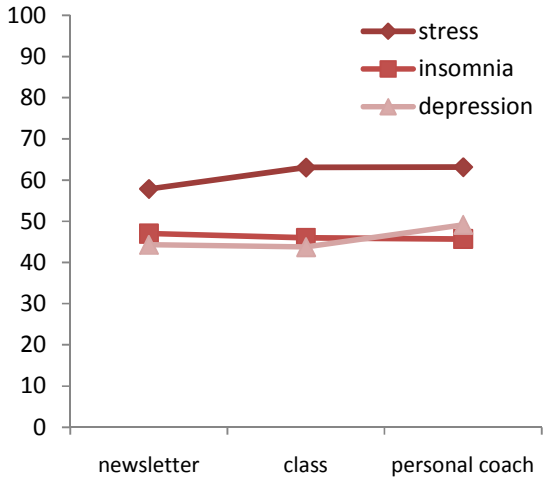


Figure 5: Factorial graph of threat × efficacy averaged over participants. The X-axis represents efficacy levels, the Y-axis the exercise intention with respect to threat levels.

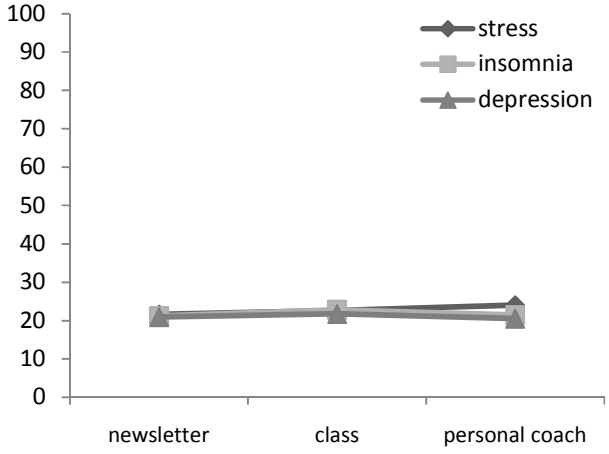


Figure 6: Factorial graph of threat × efficacy averaged over participants. The X-axis represents efficacy levels, the Y-axis the exercise intention with respect to threat levels.

ANALYSES OF COLLATERAL DATA

- *"How much time do you spend weekly performing physical activities (walking, jogging, cycling,...)?"* Participants spent between 1 and 19.5 hours a week working out (M= 4.65 h; SD= 3.87 h). One participant did not answer the question. After exclusion of outliers (linear z-scores > 2.58), a significant difference in personal workout between the 4 clusters was observed (F[3,25]= 9.279, p< .001, η_p^2 = .527). Participants belonging to Cluster III (high threat, low efficacy sensitivity) differ significantly from the other three groups with an average of 7.00 h (SD= 2.77) as opposed to 2.25 h (SD= .957) for Cluster I (high threat, high efficacy sensitivity), 3.05 h (SD= 1.64) for Cluster II (low threat, high efficacy sensitivity) and 2.92 h (SD= 1.357) for Cluster IV (low threat, low efficacy sensitivity).

- *"In your opinion, how much time should someone performing a sedentary job spend exercising weekly?"* The opinion about how much time someone performing a sedentary job should exercise on a weekly base ranged from 2 to 14 hours a week, with an average of 5.52 hours (SD= 2.80). We observed no significant difference between clusters in expectations of how many hours they should spend exercising on a weekly basis (F[3,24]= 1.884, p= .159, η_p^2 = .190).

- By subtracting the responses given on the two previous questions, we can estimate the *'perceived susceptibility'* of our respondents with regard to the presented threat. On average, participants appear to work out a little less than they think they should (M= -.84h, SD= 4.40). While some participants actually exercise more than what they perceive as necessary to stay in good health (up to 13.50h a week more), others indicate to have a lot less exercise (up to 10.50h a week less than in their opinion required). Nonetheless, overall our results reveal no significant differences between the four clusters (F[3,24]= .515, p= .676, η_p^2 = .064). Although not significant, we do notice some small differences in the number of people experiencing a lack of exercise between the clusters: in Cluster III (high threat, low efficacy sensitivity) less than half of the respondents think they should exercise more in order to stay healthy (4/9 or 44%), which seems a smaller amount than in the other clusters (3/4 or 75% in Cluster I, 7/10 or 70% in Cluster II and 5/6 or 83% in Cluster IV).

- About one third of our respondents indicated to have some complaints due to their sedentary lifestyle. In both Cluster II and Cluster III, about 3 out of 10 respondents experienced complaints due to a lack of exercise, ranging from fatigue, having a bad physical condition, to back-, neck and shoulder aches and weight gains. While three of the four respondents in Cluster I reported to have complaints due to a lack of exercise, in Cluster IV only one out of the six mentioned to experience any problems. However, no statistically significant difference is observed between clusters (χ^2[3]= 3.96, p= .264).

- "*If you exercise less than you think you should, what is the primary reason for that?*" The main reason given by participants for not working out is a lack of time (46.7%), followed by a lack of motivation (23.3%) and disliking sports (6.7%). 23.3% report working out sufficiently. No statistically significant difference is observed between clusters (χ^2[9]= 11.86, p= .221).

- Finally, 73,3% of the participants chose cinema tickets while 26.7% chose the Start to Fitness/Run/Swim/Walk book as incentive. Statistically, there is no difference between the clusters regarding incentive choice (χ^2[3]= 2.72, *p*= .436), although we do note that participants from Cluster III seem somewhat more inspired to inquire for the exercise book (50% of the respondents in this group chose this more threat alleviating incentive).

DISCUSSION

The current pilot study demonstrates that Information Integration Theory and Functional Measurement can be valuable instruments to reveal how 'threat' and 'efficacy' elements in a threat-appeal exercise promotion message are actually valuated and combined to generate an overall response to the message. The results from this pilot study suggest that different response patterns occur, due to differences in valuation and integration patterns. As different segments of receivers of the message react differently to 'threat' and 'efficacy' combinations, they obviously require a different approach, which makes designing effective mass media campaigns involving threat appeals not evident.

In the current study clearly four clusters of respondents could be discerned: those who are sensitive to both threat as well as efficacy cues in the message (Cluster I), those who appear responsive only to the efficacy component (Cluster II), those who are sensitive only to the threat appeal in the message (Cluster III) and finally those who are neither susceptible to threat nor efficacy cues (Cluster IV).

Only 4 of the 30 respondents in this study seemed to belong to **Cluster I** (*sensitive to threat & efficacy*). According to Witte's EPPM (1992, 1994) someone has to perceive the threat as severe and to be at risk in order for the threat appeal to produce the necessary fear to motivate action. With these respondents the manipulation of 'threat' in the message appeared to have an effect on their intention to exercise more. Witte also argues that when perceived 'threat' is high the ultimate response will depend on the assessment of 'efficacy'. Respondents in Cluster I also appeared sensitive to manipulations of 'efficacy' in the message. While we identified different response patterns among the participants within this first cluster, it is clear that some of the threat-appeal messages were able to increase their perception of the 'severity' or 'personal relevance' of the

threat and their perception of 'efficacy', which led them to express that they would perform the recommended behavior more. Respondents in this cluster seem to exercise somewhat less than other clusters (2,25h a week) and three out of four judge that this is less than needed in order to stay healthy. Somewhat more respondents in this particular cluster seemed to have complaints due to their inactive lifestyle than in the other groups (75% as compared to 50% when all groups are considered).

Cluster II (*sensitive to efficacy only*) contained one third of the participants in this study. While the level of 'threat' portrayed in the presented messages did not seem to impact the responses of these participants, the displayed level of 'efficacy' did significantly affect their intentions to exercise more. As respondents in this cluster appear to be insensitive to the presented threat, but indicate to be willing to exercise more given an appropriate efficacy stimulus, we can assume that their intrinsic appraisal of the threat may be high already. While 70% of the respondents in this cluster realized that they exercise less than they should, 30% actually indicated to have complaints due to a lack of exercise. According to Rimal's '*Risk Perception Attitude Framework*' (2001), which is also based on Witte's (1992, 1994) 'Extended Parallel Process Model' (see also Rimal & Real, 2003 & Rimal, Böse, Brown, Mkandawire, & Folda, 2009), people with high risk perceptions, but low efficacy beliefs are characterized by an *'avoidance attitude'*. Although the experienced threat makes them anxious about their health status, they do not believe that they are capable to execute the recommended behavior, which will lead to conflicting feelings and a plunging motivation. He argues that social marketers should focus on enhancing efficacy beliefs in this case, by presenting solutions to alleviate the threat as the fear experienced by these respondents actually makes them concerned about their health status and motivates them to do something about it. Participants belonging to Cluster II in the current study were clearly sensitive to our manipulations of efficacy in the message. However, there does not seem to be a consensus regarding to the preferred efficacy level. While some individuals within this group were mainly influenced by the availability of free classes, another sub-group seemed equally persuaded by such free classes and the presence of a personal coach. On the other hand, still another subgroup appeared much more convinced to follow the recommendation to exercise more when offered a regular e-newsletter with tips. This dissimilarity in type of preferred solution can be explained by distinctions between (vertical and horizontal) individualism and collectivism (Li and Aksoy, 2007; Singelis et al, 1995). Whereas some people like to handle things on their own and prefer to be guided in a more impersonal way, being more individualistic, others are more collectivistic, see themselves as a part of a collective and favor exercising in group rather than having to bear the burden on their own.

Another third of our participants seemed to belong to **Cluster III** (*sensitive to threat only*). While the level of 'efficacy' displayed in the message did not affect these respondents' intentions to exercise more, the portrayed level of 'threat' did significantly affect their responses. Although less than half of the subjects in this cluster feel the need to exercise more in order to stay healthy, they all indicate to exercise more when presented an appropriate threat appeal. The level of threat that appeared to generate the strongest responses concerned 'stress'. While this was not the most severe level of threat presented, it may have been deemed to be of more personal relevance. On the other hand, it is also possible that the more severe threat levels presented, evoked defensive reactions and denial of the threat (i.e. fear control). Apparently, subjects within this cluster already exercised significantly more than those in the other clusters (7h a week versus 2-3h for the other clusters), which may indicate that they acted '*proactively*' as they appear vulnerable to the presented threat. If this is the case, they would have strong efficacy beliefs already, which may explain the insensitivity to the efficacy manipulations in the message. Participants belonging to this cluster also seemed more inclined to choose the more threat alleviating Start to Fitness/Run/Swim/Walk book as incentive, as compared to the subjects in the other clusters, which suggests they may engage in '*danger control*' (i.e. alleviating the threat by performing the recommended behavior). Actually, this cluster strongly seems to resemble the '*proactive*' attitudinal group, conceptualized by Rimal (2001) in his '*Risk Perception Attitude Framework*'. According to this framework, individuals with low risk perceptions and high efficacy beliefs typically demonstrate a *'proactive attitude'*. They are not motivated by their perceived risk status, but rather by a desire to remain healthy and their strong efficacy beliefs. In line with Rimal's expectations, the current study proves that enhancing their risk perceptions can raise their existing motivation to adopt the recommended behavior.

One last group, **Cluster IV** (*indifferent*), appears indifferent to the different threat and efficacy combinations portrayed in the threat appeal message. One fifth of the subjects in this study could not be persuaded any more or less to engage in exercise by any of the message combinations confronted with. Possibly they did not feel any of the presented threats to be personally relevant (i.e. 'low susceptibility'), which could be the case for those who feel they already exercise enough. Only 17% of the participants belonging to this group aired complaints due to a lack of exercise. Still, with an average amount of exercise of 2,92h per week, 83% of the respondents in this cluster believed to exercise less than they should in order to remain healthy. On the other hand, it could also very well be that respondents within this cluster do not really believe that exercising more will alleviate the threat (i.e. 'low response efficacy') or they could doubt that they will be able to carry out the recommended behavior anyway (i.e. 'low self efficacy'), for example due to a lack of time, which is the main reason given by participants for not working out (mentioned by 47% of the respondents

in the total sample). Both of these 'efficacy-related' reasons may have led participants in this cluster to deny the threat or act defensively (i.e. engage in 'fear control'). It is even possible that people within this cluster intend to keep up with their maladaptive behavior even though all four components (i.e. 'severity', 'susceptibility', 'response-efficacy' and 'self-efficacy') are met. According to Witte (1992), this is the case when the reward of that behavior is perceived as greater than the severity or the susceptibility of the threat, which may be true for people who really dislike exercising (7% of the respondents in our total sample). Finally, some people just are unwilling to admit that they could be influenced by persuasive communications.

CONCLUSION

The results of this pilot study reveal that designing effective mass media campaigns involving threat appeals is not evident. As different segments of receivers of the message react differently to 'threat' and 'efficacy' combinations, they obviously require a different approach. In this study we proposed to use Information Integration Theory and its methodological counterpart Functional Measurement, to analyze the integration process of the different stimuli.

Clearly four groups of respondents could be observed in this study: those who are sensitive to both threat as well as efficacy cues in the message (Cluster I), those who appear responsive only to the efficacy component (Cluster II), those who are sensitive only to the threat appeal in the message (Cluster III) and finally those who are neither susceptible to threat nor efficacy cues (Cluster IV).

This preliminary study clearly demonstrates the value of the use of Information Integration Theory and Functional Measurement in order to be able to discern such different response patterns among different groups of individuals. This method can be used to reveal how 'threat' and 'efficacy' elements in a threat-appeal exercise promotion message are actually valuated and combined to generate an overall response to the message.

In order to be able to develop effective threat appeal messages, obviously more qualitative research is required (1) in order to ascertain the perceived susceptibility and efficacy among the target population and (2) in order to assess the preference for solutions to alleviate the threat. Further research should also be conducted to establish whether the groups identified in this study can be retrieved in bigger samples and/or whether even new segments emerge. In a further large-scale study, the sizes of the respective segments could be assessed as well as respondents' '*intrinsic'* perceived threat (severity & susceptibility) and efficacy (response efficacy & self-efficacy), which can be captured by means of the 12-item '*Risk Behavior Diagnosis Scale*' developed by Witte (1995). This could also be linked to further socio-demographic and lifestyle indicators in order to profile the

segments retrieved, which could eventually be reached more effectively based on this information (cf. Wedel, 2001).

REFERENCES

Andersen, R.E., Crespo, C.J. & Cheskin, L.J.P.M. (1998). Relationship of physical activity and television watching with body weight and level of fatness among children. *Journal of the American medical association*, *279*(12), 938-942.

Anderson, N.H. (1981). *Foundations of information integration theory.* NJ: Academic Press.

Anderson, N.H. (1982). *Methods of information integration theory.* NJ: Academic Press.

Anderson, N.H. (1996). *A functional theory of cognition.* NJ: Lawrence Erlbaum Associates.

Anderson, N. H. (2001). *Empirical direction in design and analysis.* NJ: Lawrence Erlbaum Associates.

Anderson, N. H. (2009). *Unified social cognition.* NY: Psychology Press.

Arthur, D. & Quester P. (2004). Who's Afraid of That Ad? Applying Segmentation to the Protection Motivation Model. *Psychology & Marketing*, *21*(9), 671–696.

Basil, M.D., Schooler, C., Altman, D.G., Slater, M., Albright, C. L., & Maccoby, N. (1991). How cigarettes are advertised in magazines: Special messages for special markets. *Health Communication*, 3, 75-91.

Bauman, A., Smith, B.J., Maibach, E.W. & Reger-Nash, B. (2006). Evaluation of mass media campaigns for physical activity. *Evaluation and Program Planning*, 29, 312-322.

Berry, T.R. (2006). Who's even interested in the exercise message? Attentional bias for exercise and sedentary-lifestyle related words. *Journal of Sport and Exercise Psychology*, 28, 4-17.

Biddle, S., Fox, K.R. & Boutcher, S.H. (2000). *Physical activity and psychological well-being.* Routledge.

Booth, M., Bauman, A., Oldenburg, B. & Magnus, P. (1992). Effects of a national mass-media campaign on physical activity participation. *Health Promotion International*, 7, 241-247.

Boster, F.J. & Bostrom, R.N. (1984). *Fear-arousing persuasive messages* (Vol. 8). Beverly Hills, CA: Sage.

Cauberghe, V., De Pelsmacker, P., Janssens, W. & Dens, N. (2009). Fear, threat and efficacy in threat appeals: Message involvement as a key mediator to message acceptance. *Accident Analysis and Prevention*, 41, 276–285.

Chang, P.P., Ford, D.E., Mead, L.A., Cooper-Patrick, L. & Klag, M.J. (1997) Insomnia in Young Men and Subsequent Depression: The Johns Hopkins Precursors Study. American *Journal of Epidemiology*, *146*(2), 105-114.

Das, E.H.H.J., de Wit, J.B.F. & Stroebe, W. (2003). Fear Appeals Motivate Acceptance of Action Recommendations: Evidence for a Positive Bias in the Processing of Persuasive Messages. *Personality and social psychology Bulletin*, 29, 650-664.

Donovan, R.J. & Henley, N. 1997. Negative Outcomes, Threats and Threat Appeals: Towards a Conceptual Framework for the Study of Fear and Other Emotions in Social Marketing Communications. *Social Marketing Quarterly*, *4*(1), 56-67.

Henley, N. & Donovan, R.J. (2002). Identifying appropriate motivations to encourage people to adopt healthy nutrition and physical activity behaviors. *Journal of Research for Consumers*. 4.

Hillsdon, M., Thorogood, M., White, I. & Foster, C. (2002). Advising people to take more exercise is ineffective: a randomized controlled trial of physical activity promotion in primary care. *International Journal of Epidemiology*, 31, 808-815.

Hovland, C.I., Janis, I.L. & Kelley, H.H. (1953). *Communication and persuasion, psychological studies of opinion change.* New Haven CT: Yale University Press.

Hu, F.B., Li, T.Y., Colditz, G.A., Willett, W. C., & Manson, J.E. (2003). Television Watching and other Sedentary Behaviors in Relation to Risk of Obesity and Type 2 Diabetes Mellitus in Women. *Journal of the American Medical Association*, *289*(14), 1785-1791.

Janis, I.L. (1967). Effects of fear arousal on attitude change: Recent developments in theory and experimental research. In L. Berkowitz (Ed.), Advances in experimental social psychology. (pp.166-225). New York: Academic Press.

Janis, I.L. & Feshbach, S. (1953). Effects of fear arousing communications. *The Journal of Abnormal and Social Psychology*, 48, 78-92.

Jans, M.P., Proper, K.I., & Hildebrandt, V.H. (2007). Sedentary Behavior in Dutch Workers. Differences between occupations and business sectors. *American Journal of Preventive Medicine, 33*(6), 450-454.

Kahn E.B., Ramsey, L.T., Brownson R.C., Heath G.W., Howze E.H., Powell K.E., Stone E.J., Rajab M.W. & Corso P. (2002) The effectiveness of interventions to increase physical activity and the task force on community preventive services. *American Journal of Preventive Medicine*, *22*(4S), 73-107.

Leventhal, H. (1971). Fear appeals and persuasion: the differentiation of a motivational construct. *American Journal of Public Healt*h, *61*(6), 1208-1224.

Lewis, I., Watson, B., Tay, R. & White, K.M. (2007). The role of fear appeals in improving driver safety: A review of the effectiveness of fear-arousing (threat) appeals in road safety advertising. *International Journal of Behavioral and Consultation Therapy*, *3*(2), 203-222.

Li, F. & Aksoy, L. (2007). Dimensionality of individualism-collectivism and measurement equivalence of Triandis and Geldand's scale. *Journal of Business and Psychology*, *21*(3), 313-329.

Mairesse, O., Hofmans, J., De Valck, E., Cluydts, R. & Theuns, P. (2007). On the linearity of subjective sleepiness measures. *Teorie & Modelli*, XII, 289-298.

Mairesse, O., Hofmans, J. & Theuns, P. (2008). The Functional Measurement Experiment Builder suite: two JAVA-based programs to generate and run Functional Measurement experiments. *Behavioral Research Methods*, *40*(2), 408-412.

MacAuley, D. (1993). Exercise and health promotion. *British Journal of General Practice*, November, 443-444.

Mongeau, P.A. (1998). *Another look at fear-arousing persuasive appeals*. s.n.

Morin, C.M., Rodrigue, S. & Ivers, H. (2003). Role of stress, arousal, and coping skills in primary insomnia. *Psychosomatic Medicine*, *65*(2), 259-67.

Plotnikoff, R.C. (2006). Physical activity in the management of diabetes: population-based perspective and strategies. *Canadian Journal of Diabetes*, *30*(1), 52-62.

Rundall, C.S. & Weiss, D.J. (1994). Nurses' fear of contagion: a Functional Measurement Analysis. *Medical Decision Making,* 14, 40-45.

Rimal, R.N. (2001). Perceived risk and self-efficacy as motivators: understanding individuals' long-term use of health information. *Journal of Communication*, *51*(4), 633-654.

Rimal, R.N. & Real, K. (2003). Perceived Risk and Efficacy Beliefs as Motivators of Change: Use of the Risk Perception Attitude (RPA) Framework to Understand Health Behaviors. *Human Communication Research*, 29(3), 370-399.

Rimal, R.N., Böse, K., Brown, J.; Mkandawire, G. & Folda, L. (2009). Extending the Purview of the Risk Perception Attitude Framework. *Health Communication, 24*(3), 210-218.

Roskos-Ewoldsen, D.R., Yu, H.J. & Rhodes, N. (2004). Fear Appeal Messages Affect Accessibility of Attitudes Toward the Threat and Adaptive Behaviors. *Communication Monographs*, *71*(1), 49–69.

Rogers, R.W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*, 91, 93-114.

Rogers, R.W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology* (pp. 153- 176). New York: Guilford.

Rossiter, J.R. & Thornton J. (2004). Fear-Pattern Analysis Supports the Fear-Drive Model for Antispeeding Road-Safety TV Ads. *Psychology & Marketing*, *21*(11), 945–960.

Singelis, T.M., Triandis, H.C., Bhawuk, D.P.S. & Michele, J.G. (1995). Horizontal and Vertical Dimensions of Individualism and Collectivism: A Theoretical and Measurement Refinement. *Cross-Cultural Research*, *29*(3), 240-275.

Smalec, J.L. & Klingle, R.S. (2000). Bulimia Interventions via Interpersonal Influence: The Role of Threat and Efficacy in Persuading Bulimics to Seek Help. *Journal of Behavioral Medicine, 23*(1) 35-57.

Sutton, R.S. (1982). Fear-arousing communications: A critical examination of theory and research. Social *Psychology and Behavioral Medicine*, 303-337.

Tanner, J.F.Jr., Hunt, J.B. & Eppright, D.R. (1991). The Protection Motivation Model: A Normative Model of Fear Appeals. *Journal of Marketing*, 55, 36-45.

Wedel, M. (2001). Is Segmentation History? Somewhere between one-to-one and mass marketing, it still plays a key role. *Marketing Research, 13*(4), 26-29.

Weiss, D.J. (2006). *Analysis of Variance and Functional Measurement: a practical guide*. New York: Oxford University Press.

Witte, K. (1992). Putting the fear back into fear appeals. The extended parallel process model. *Communication Monographs*, 59, 329-349.

Witte, K. (1994) Fear Control and Danger Control: A Test of the Extended Parallel Process Model. *Communication Monographs*, *61*(2), 113-134

Witte, K. & Allen, M. (2007). A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns. *Health Education & Behavior*, 27, 591-615.

World Health Organization (a). 2009. Physical Inactivity: A Global Public Health Problem. Consulted November 17th 2009, http://www.who.int/dietphysicalactivity/factsheet_inactivity/en/index.html

World Health Organization (b). 2009. Benefits of Physical Activity. Consulted November 17th 2009, http://www.who.int/dietphysicalactivity/factsheet_benefits/en/index.html

Wong, N.C.H. (2009). Antismoking Threat and Efficacy Appeals: Effects on Smoking Cessation Intentions for Smokers with Low and High Readiness to Quit. *Journal of Applied Communication Research, 37*(1) 1-20.

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