Changes in implicit and explicit exercise-related attitudes after reading targeted exercise-related information

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ABSTRACT

The purpose of this research was to examine if reading exercise information targeted at pretest explicit attitudes were related to changes in corresponding implicit or explicit attitudes. The associative-propositional evaluation (APE) model guided the research. Participants (N = 154) completed pretest measures of implicit and explicit attitudes; one week later they read information that targeted pretest explicit affective or instrumental attitudes and again completed the attitude measures. Results showed changes in implicit attitudes in both instrumental message conditions that supported the hypotheses that counter-attitudinal information would result in implicit attitude change in the opposite direction to the reading whereas information that targeted congruent attitudes would show changes in keeping with the information. This study demonstrates the importance of considering how implicit cognitions may change as a result of reading exercise-related information, and the relationship between implicit and explicit attitudes.

Keywords: Attitude change Dual-processing models Messaging Exercise

Attitudes are evaluations of ideas, objects, or behaviors, which indicate likes, dislikes, or feelings in relation to the evaluated item (Bohner & Dickel, 2011; Petty & Brinol, 2010). They are an important construct in many models of health behavior because of their relationship to behavioral intention and uptake (e.g., theory of planned behavior; Ajzen, 1985). In the exercise domain, attitudes have been conceptualized as affective (e.g., fun) or instrumental (e.g., healthy; Rhodes, Blanchard, & Matheson, 2006). For example, a person may believe in the health benefits of exercise (an instrumental attitude) but nonetheless find exercise unpleasant (an affective attitude).

In recent years, researchers have begun to understand the importance of examining not only explicit attitudes, which have received the vast majority of research attention, but also examining implicit attitudes and their possible relationship to health behavior (Sheeran, Gollwitzer, & Bargh, 2013). Implicit and explicit attitudes are included in dual-processing models which consider cognitive processes that are slow and deliberative and rely on reasoning about the relationships between objects (i.e., explicit attitudes) and processes that are fast and non-deliberative and arise from automatically activated associations (i.e., implicit processes) (cf. Evans, 2008). For example, the associative-propositional evaluation (APE) model proposes that attitudes can be represented implicitly as automatically activated affective associative pathways and explicitly as expressions of attitude that are based on propositional beliefs (Gawronski & Bödhausen, 2006, 2011). As conceptualized by the APE model, implicit attitudes reflect associations in memory and are the result of the interaction between pre-existing associations and current external inputs (e.g., a message). Explicit attitudes reflect reasoning about the validity of automatically activated associations. Accordingly, it is conceivable that one may have an automatic negative association of exercise as unpleasant (an implicit affective attitude), but upon being persuaded that exercising with friends may be fun, endorse exercise positively on a questionnaire (an explicit affective attitude). Greater understanding of the interplay between implicit and explicit exercise-related attitudes is necessary because implicit attitudes may be related to intentions to be active (Berry, Jones, McLeod, & Spence, 2011) and explain variance in exercise behavior beyond that explained by explicit cognitions (Conroy, Hyde, Doerksen, & Ribeiro, 2010).

One important question is how implicit and explicit exercise-related attitudes might be affected as a result of reading an exercise-related message. The APE model proposes various ways in which implicit attitudes might be affected including through...
changes in associative structure brought about by evaluative conditioning, or a change in pattern activation that occurs when a context cue influences activation of associations for something that is already familiar (Gawronski & Bodenhausen, 2006). It is the activation of associations that is of interest in the present research because exercise is likely associated with multiple outcomes that can be instrumental (e.g., health or injury) or affective (e.g., fun or boring). These associations may be created by exposure to various sources (e.g., media, public health units, fitness magazines) and personal experience. For example, when someone is given information about exercise from a doctor, associations between exercise and health may be activated which would be reflected as a positive attitude on an implicit attitudes measure. However, if information is counter-attitudinal, it is possible that implicit attitudes will show an ironic effect. This means activated implicit attitudes will be opposite to the information presented because the old association was not rejected; rather, the original evaluation was further activated. Such ironic effects are thought to occur because negating a proposition at an explicit level may result in simultaneously activating related concepts at the associative level (Jones, Kirkland, & Cunningham, 2015). For example, processing information about how exercise might cause injury may automatically activate associations related to exercise with health. Importantly, different cues about the same attitude concept (e.g., exercise) can influence which associative pattern is activated resulting in different attitudes toward the same object.

Explicit attitudes may be influenced through a change in associative evaluation, through change in the set of propositions that need to be evaluated (because of new information or through additional consideration of propositions that are already known), or through a change in strategy used to achieve consistency about a set of propositions. Gawronski and Bodenhausen (2006) argue that persuasive material can affect explicit attitudes likely because new information changes propositions to be evaluated. For example, being given information about exercise from a doctor may give rise to the automatic association of exercise as beneficial, which is then considered to be ‘true’ at an explicit level. Relatively little research has examined the relationship between exercise-related implicit and explicit attitudes although there is some evidence they are independent (Hyde, Doerksen, Ribeiro, & Conroy, 2010). Research is needed to further understand how implicit and explicit attitudes are related and how they may be affected through reading information about exercise. The current research examined how attitudes may be affected when presented with information that is counter-attitudinal or targets congruent but not maximal attitudes. This allows for testing of whether attitudes can be changed (in the case of counter-attitudinal information) or strengthened (in the case of information targeting congruent attitudes).

Specifically, the purpose of this research was to examine how reading exercise-related information targeted at pretest explicit attitudes was related to corresponding implicit or explicit attitudes. Pretest explicit attitudes were targeted because according to the APE model, if a message includes information that is counter to the original evaluation, propositional reasoning is engaged such that propositional processes are affected. It is less likely that implicit attitudes will be affected but any associative evaluations should be opposite to counter-attitudinal information such that a negative message should result in more positive implicit attitudes and vice versa for a positive message (Gawronski & Bodenhausen, 2006). Thus, in order to test our first hypothesis, we targeted pretest explicit attitudes to examine if the possible negation of the propositions contained within the messages was associated with corresponding ironic effects at the implicit level. Given the paucity of research examining these questions, the following exploratory hypotheses are made:

**H1.** Counter-attitudinal exercise-related information is expected to have an influence on explicit attitudes primarily such that explicit attitudes will correspond with the message and implicit associations will be in the direction opposite to the message given (i.e., an ironic effect).

**H2.** If the information targets congruent positive attitudes, implicit associations should be in the direction of the information because the already existing associations are activated and likely to be affirmed at an explicit level. Thus, it is hypothesized that information that is not counter-attitudinal but is given to participants with congruent attitudes will result in explicit and implicit attitudes that are consistent with the direction of the message.

### 1. Method

#### 1.1. Participants

Participants (N = 155) were recruited from a first year psychology class in which students receive course credit for study participation (or can choose to do an alternative learning opportunity). The average age was 19.4 (SD = 1.96) years and 69.7% were female.

#### 1.2. Measures

##### 1.2.1. Implicit attitudes

Participants completed two versions of the go/no go association task (GNAT; Nosek & Banaji, 2001). In both tasks, the target category was exercise but the evaluative attributes differed between them such that for the evaluative dimension, which was good-bad, the words represented either affective [e.g., fun-boring, pleasant-unpleasant] or instrumental [e.g., healthy-unhealthy, fit-unfit] attitudes. In both tasks, the contrast target category was generic words (e.g., bookshelf, carpet). Participants were instructed to categorize words that belong to a target category by hitting the space bar (go) as fast as they can, or to ignore the word if it does not belong to the category (no go). A fixation cross was shown for 500 ms (msec) preceding each trial and the response deadline for categorizing targets was 850 msec because response time (RT) was used as the outcome measure. Thus, a longer deadline was appropriate. Feedback in the form of a red “X” when an error was made or a blue “O” for a correct response was provided after each trial. There was a short break between each block during which participants were told the target words for the upcoming block. The block order was counterbalanced so that some participants categorized exercise and good words first, others exercise and bad, and so on. The order of the affective and instrumental GNATS was also counterbalanced across participants.

Reliability was calculated using odd/even experimental trials rather than first and second half splits because implicit measures are sensitive to practice effects and learning strategies (Perugini, Richetin, & Zogmaister, 2010; Williams & Kaufmann, 2012). Reliability of both GNATS was good. There were no significant differences between odd and even trials when pairing exercise with good or bad at either pretest or posttest (all t-test p > .11) and the intra-class correlations ranged from .72 to .85. The response times were similar to those reported by Nosek and Banaji (2001, p. 648) even with a response deadline as short as 500 msec. This indicates participants in the current study were responding quickly.

##### 1.2.2. Demographics

Participants self-reported their age and gender.
1.2.3. Explicit attitudes
Affective attitudes toward exercise were measured across four items (pleasant-unpleasant, enjoyable-unenjoyable, pleasurable-painful, good-bad) using 7-point bipolar adjective scales as suggested by Ajzen (2006). Instrumental attitudes were measured across four items (harmful-beneficial, worthless-valuation, healthy-unhealthy, important-unimportant). Participants rated each item on the statement: ‘For me to exercise for at least 30 min each day in the forthcoming month is ...’ The responses to items were reverse scored as appropriate so that a higher score reflected a more positive affective or instrumental attitude. The internal consistency for the affective attitudes at pretest was $\alpha = .81$, and at posttest was $\alpha = .84$. The internal consistency for instrumental attitudes at pretest was $\alpha = .69$, and at posttest was $\alpha = .77$.

1.2.4. Exercise behavior
The Godin Leisure-Time Exercise Questionnaire (Godin, 2011) measured activity level of the participants. Participants reported their typical weekly frequency of leisure-time strenuous (characterized as heart beats rapidly, sweating), and moderate (characterized as not exhausting, light perspiration) physical activity in bouts 15 min or longer. Following the guidelines of Godin (2011), the number of reported bouts of moderate activity was multiplied by 5 (the Metabolic equivalent [METs]) and number of strenuous bouts was multiplied by 9, and the scores were summed. The summed METS score was used as an estimate of moderate and vigorous physical activity (MVPA).

1.3. Exercise-information
Each participant read a paragraph that targeted their pretest explicit instrumental or affective attitudes, or a control reading. Thus, two readings included positive information about exercise and two contained negative information about exercise. For example, the positive instrumental paragraph read: “Research has shown that exercise is a very useful activity for people. This is because people find exercise is very beneficial. Going to the gym, working out, playing sports or going for a run is healthy and reduces risk of injury. These are some important reasons why exercise is such a positive experience for people.” The negative instrumental paragraph had the same wording except discussed exercise as harmful, increases risk of injury, and is a negative experience. The positive and negative affective paragraphs used much the same wording except discussed exercise as enjoyable or unenjoyable, fun or boring, and how it makes them feel good or bad. The control paragraph was the same length and discussed cooking as a popular activity. Argument strength was tested with an independent sample of undergraduate students ($N = 14$) across four items assessing message believability, trustworthiness, convincingness, and conclusiveness, all rated from 1 to 7. The internal consistency across these items was high ($\alpha = .89$), therefore a mean score was used. Each participant was randomly assigned two messages to rate, yielding five to seven ratings of each message with a range of 3.5–5.4. The strongest messages were positive affective and control, then positive instrumental, and then the two negative conditions.

1.4. Procedure
Prior to starting the pretest, participants were randomly assigned to one of three conditions: instrumental attitudes, affective attitudes, or control. They then completed the GNATs and questionnaires. Explicit attitudes for each participant were calculated after the first session. One week later, participants completed the posttest during which they read information about exercise or cooking (control condition). The one-week time frame was used to avoid pretest sensitization wherein the act of completing a measure may have an influence on subsequently measured cognitions and behavior; this effect has been shown in the exercise literature at explicit (Godin, Belanger-Gravel, Amireault, Vohl, & Perusse, 2011) and implicit levels (Keatley, Clarke, Ferguson, & Hagger, 2014). Participants in the instrumental condition with explicit instrumental attitudes at pretest lower than 5.75 read the positive instrumental reading whereas those with explicit instrumental attitudes at pretest higher than 5.75 read the negative instrumental attitudes information. A similar process took place for those participants randomly allocated to the affective attitudes condition; participants with explicit pretest affective attitudes lower than 5.00 read the positive affective information and those with explicit pretest affective attitudes higher than 5.00 read the negative affective information. Participants in the control condition read the cooking information. The cut-off values were determined a priori based on previous research, which show close to ceiling instrumental attitudes and somewhat lower affective attitudes (e.g., Rhodes et al., 2006). The cut-offs for the current research reflected these values but were a little lower than those reported by previous authors to target participants with congruent attitudes in the conditions where they read positive information, thus allowing for testing of the second hypothesis (examining the effects of targeting congruent attitudes to determine if they can be strengthened). To further adequately test the second hypothesis, participants with negative explicit attitudes (scores < 4.0) were excluded from analyses. Participants in the negative instrumental and affective attitudes conditions had high pretest explicit attitudes and thus received counter-attitudinal information, allowing for the testing of the first hypothesis. Immediately after reading the information, participants completed the GNATs and questionnaires again. At the end of the posttest session all participants were fully debriefed; in particular, those participants in the negative exercise reading conditions were assured that contrary to what they read, exercise has many benefits.

1.5. Data analysis
Prior to calculating RT scores, errors and responses faster than 250 msec were removed. Pre and posttest implicit attitudes were calculated by subtracting RTs for pairing exercise with good from exercise with bad so that a positive score indicates positive implicit attitudes and a negative score indicates a negative implicit attitude. To determine if there were any significant changes in attitudes, four repeated measures analysis of variance tests (RM ANOVA) were conducted, one each for explicit and implicit affective and instrumental attitudes. In each, pretest and posttest attitudes were the within subjects variables and experimental condition the between subjects variable. Results were followed up with univariate post-hoc tests and cohen’s $d$ was used to interpret the findings.

2. Results
Of the 155 participants who completed pretest measures, one provided very little data across a number of measures and that participant’s data were omitted. An additional 23 either did not return for the second session ($n = 18$), or did not provide complete data ($n = 5$). Little’s MCAR test showed data were missing at random ($p = .47$); therefore, the data for 23 participants was imputed ($m = 5$) and the pooled results are reported. There were no differences in significance of tests in the imputed analyses than when the analyses were conducted with the data from the 23 participants removed. There was no significant differences between conditions at pretest in age, $F(4, 148) = .17, p = .96$, or
gender, $\chi^2 = 3.33, p = .50$. There was a significant difference in MVPA, $F(4, 148) = 2.92, p = .02$. Participants with the highest affective attitudes ($M = 51.19$ [SD = 24.32]) or highest instrumental attitudes ($M = 55.78$ [SD = 48.02]) had higher pretest MVPA than those with lower affective attitudes ($M = 21.08$ [SD = 19.41]) or lower instrumental attitudes ($M = 25.86$ [SD = 16.65]), or control participants who were in the middle with a Mean MVPA of 34.09 (SD = 24.74). The differences in MVPA are to be expected and support the assignment of participants to their respective groups.

There were very few participants with low explicit attitudes. Six participants had instrumental attitudes less than 4.0 yielding cells of positive instrumental $n = 17$, negative instrumental $n = 38$, positive affective $n = 27$, negative affective $n = 27$, and control $n = 39$. Seventeen participants had affective attitudes less than 4.0 yielding cells of positive instrumental $n = 16$, negative instrumental $n = 36$, positive affective $n = 21$, negative affective $n = 27$, and control $n = 37$. There were relatively few participants in the positive instrumental condition because a minority of participants reported lower instrumental attitudes. All variables were normally distributed with skewness between -.41 and .38 and kurtosis between -.55 and 1.04, with the exception of explicit instrumental attitudes at pretest (skewness = 1.89, kurtosis = 4.09) and at posttest (skewness = -1.63 and kurtosis = 3.32). Implicit-explicit correlations at pretest and posttest are shown in Table 1.

### 2.2. Implicit attitude change

The RM ANOVA examining changes in implicit affective attitudes showed no significant main effect for change in attitude, $F(1, 132) = .56, p = .46, \eta^2 = .004$, but there was a significant change in attitude by condition effect, $F(4, 132) = 3.22, p = .01, \eta^2 = .09$. Post hoc tests indicated a significant decrease in affective attitudes in the negative affective information condition, $F(1, 26) = 7.16, p = .01$, Cohen's $d = .51$, showing a medium effect size. There were no significant changes in the positive instrumental condition ($p = .08$), positive affective condition ($p = .44$), negative instrumental condition ($p = .16$) or the control condition ($p = .34$).

The analysis examining change in explicit instrumental attitudes showed no significant main effect for attitude change, $F (1, 143) = 37, p = .55, \eta^2 = .002$, but there was a significant change by condition effect, $F(4, 143) = 3.74, p = .007, \eta^2 = .09$. Post hoc tests showed a significant change in the positive instrumental condition, $F(1, 16) = 4.78, p = .04$, Cohen's $d = .66$, a medium effect size. There were no significant changes in the negative instrumental condition ($p = .21$), positive affective ($p = .47$), negative affective ($p = .40$), or control ($p = .52$) conditions.

### 3. Discussion

This research examined change in implicit and explicit attitudes after reading exercise information. In terms of explicit attitudes, it was hypothesized that changes would correspond with the direction of the information that was read, regardless of whether the information was truly counter-attitudinal (negative attitudinal conditions) or targeted congruent but not maximal attitudes (positive attitudinal conditions). This hypothesis was supported for some of the conditions: there were negative changes in explicit affective attitudes in participants who read negative affective information (i.e., exercise is boring and not enjoyable), and a significant increase in instrumental attitudes in participants with congruent attitudes who read positive instrumental information (i.e., exercise is beneficial for one’s health). These changes demonstrate that explicit attitudes may change in the direction of the readings. In terms of APE model suppositions, it may be that exercise-related material resulted in explicit changes because the new information presented new propositions to evaluate (Gawronski & Bodenhausen, 2006). In practical terms these results indicate that exercise-related materials can get people thinking differently about exercise, resulting in attitude change, at least in the short-term.

### Table 1

<table>
<thead>
<tr>
<th>Reading condition</th>
<th>Time</th>
<th>Explicit affective</th>
<th>Implicit affective</th>
<th>Affective correlations</th>
<th>Explicit instrumental</th>
<th>Implicit instrumental</th>
<th>Instrumental correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative affective</td>
<td>Pre</td>
<td>6.17 (.74)</td>
<td>17.62 (38.32)</td>
<td>.20</td>
<td>6.66 (.41)</td>
<td>10.99 (33.34)</td>
<td>.19</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>5.73 (.97)</td>
<td>16.28 (34.70)</td>
<td>.28</td>
<td>6.56 (.60)</td>
<td>8.31 (31.86)</td>
<td>.32</td>
</tr>
<tr>
<td>Positive affective</td>
<td>Pre</td>
<td>4.60 (.34)</td>
<td>17.70 (41.35)</td>
<td>.04</td>
<td>6.24 (.73)</td>
<td>15.15 (37.31)</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>4.76 (1.06)</td>
<td>2.57 (33.38)</td>
<td>.15</td>
<td>6.16 (.88)</td>
<td>1.08 (42.07)</td>
<td>.18</td>
</tr>
<tr>
<td>Negative instrumental</td>
<td>Pre</td>
<td>5.82 (.97)</td>
<td>-4.76 (38.05)</td>
<td>.02</td>
<td>6.57 (.41)</td>
<td>4.41 (38.83)</td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>5.64 (.90)</td>
<td>22.07 (37.03)</td>
<td>.26</td>
<td>6.48 (.48)</td>
<td>9.61 (36.34)</td>
<td>.15</td>
</tr>
<tr>
<td>Positive instrumental</td>
<td>Pre</td>
<td>4.69 (.79)</td>
<td>-1.73 (41.73)</td>
<td>.19</td>
<td>5.34 (.73)</td>
<td>13.10 (45.59)</td>
<td>.39</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>4.98 (.87)</td>
<td>6.21 (32.46)</td>
<td>.07</td>
<td>5.82 (.73)</td>
<td>15.77 (37.00)</td>
<td>.23</td>
</tr>
<tr>
<td>Control</td>
<td>Pre</td>
<td>5.60 (.90)</td>
<td>-2.04 (44.07)</td>
<td>.19</td>
<td>6.42 (.82)</td>
<td>-4.16 (34.06)</td>
<td>.20</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>5.50 (1.05)</td>
<td>13.22 (39.03)</td>
<td>.29</td>
<td>6.39 (.81)</td>
<td>-4.46 (32.99)</td>
<td>.08</td>
</tr>
</tbody>
</table>
The changes seen in affective attitudes are of particular interest because affective attitudes have been shown to be more predictive of behavior than instrumental attitudes (Rhodes et al., 2006). Further, a meta-analysis showed a medium effect size between affective judgments and physical activity behavior (Rhodes, Fiala, & Conner, 2009). Thus, although attitudes do not account for all the variance in physical activity behavior, there is evidence that explicit affective attitudes are related to behavior and that implicit attitudes can also explain some variance in behavior beyond what is accounted for by explicit attitudes (Conroy et al., 2010). The findings of the current research showed negative changes in affective attitudes when the presented information described exercise as not very enjoyable. This finding highlights the potential danger of exposing people to information that may lead them to think that exercise is unpleasant. This idea is reinforced by a study that showed that the extreme depictions of exercise on the reality television program The Biggest Loser, was associated with lower attitudes in participants who viewed the exercise as “terrifying” or “painful and stressing” (Berry, McLeod, Pankratow, & Walker, 2013).

Indeed, it is likely that even participants in the present study who indicated they find exercise fun or enjoyable at pretest may have reflected on times they experienced it as boring or unpleasant and this was reflected by their changed attitude. Conversely, there were no changes in explicit affective attitudes in the positive affective condition. These participants did not explicitly state that exercise is not enjoyable and were relatively ambivalent about their liking of it. Thus, even when told it can be fun, they likely rejected the proposition and maintained their stance of not really feeling that strongly about it. There were also no significant changes in instrumental attitudes in the negative instrumental condition. It is conceivable that these participants were strongly convinced of the benefits of being active and no amount of information would sway their opinion; others have shown that message strength is not a factor when messages are incongruent with an issue for which someone already feels positively (von Borgstede, Andersson, & Hansla, 2014).

A unique contribution of this research is the examination of changes in implicit attitudes after reading exercise-related information. The results partially supported the hypothesis that counter-attitudinal information would result in implicit attitude change in the opposite direction to the reading whereas information that targeted congruent attitudes would show changes in keeping with the information. In support of the first hypothesis, participants who had very high positive instrumental attitudes at pretest and read information regarding how exercise may cause injury and harm (and thus was counter-attitudinal) showed an ironic effect in affective attitudes. As postulated by Jones et al. (2015), negating such information likely automatically activated associations of exercise as something pleasurable. That is, they may disagree with the information and thus there was no change in explicit attitudes, but in disagreeing, positive associations with exercise were activated. This finding may be further explained by the “past attitudes are still there” (PAST) model, which proposes that old attitudes still exist in the presence of ‘new’ attitudes and can influence evaluations (Pett, Tormala, Brinol, & Jarvis, 2006). According to the PAST model, prior attitudes impact current evaluative responding if the relationship between the old attitude and the object being evaluated (which in the case of the current research is exercise) is stronger than the relationship between exercise and the new attitude created after reading the information. In such a case, only the original, positive, evaluation of exercise is retrieved and represented and the rejection of the old already established attitude is not demonstrated. In a sense, participants in the current study may have not wanted to believe the new information, which made the old attitude more accessible. Thus, the change was seen in their automatic association that they actually like exercise (i.e., a shift in implicit affective attitudes).

Other researchers have shown that large amounts of counter-attitudinal information are needed to see change in implicit attitudes that are congruent with the presented information (Rydell, McConnell, Strain, Claypool, & Hugenberg, 2007). However, their experiments involved counter-attitudinal information regarding a fictional person about whom they first formed an opinion during the experiment. Conversely, the current experiment included counter-attitudinal information toward a topic with which participants were already familiar and had preexisting attitudes. Thus, the findings partially support APE model predictions that persuasive materials may influence implicit attitudes due to a change in pattern activation that occurs when a context cue influences activation of associations for something that is already familiar. When such information is counter-attitudinal and requires someone to negate a previously held evaluation, the information should mainly influence propositional reasoning, and any implicit changes will be opposite to the presented information due to ironic effects (Gawronski & Bodenhausen, 2006).

Participants in the positive instrumental condition showed an increase in implicit and explicit attitudes. It is important to note that these participants did not read information that was counter-attitudinal; at pretest their attitudes were weakly positive about exercise. Thus, as highlighted in the APE model, the default for propositional reasoning in such a situation is to affirm the validity of an attitude (Gawronski & Bodenhausen, 2006). In terms of the PAST model, the old, weaker, evaluation of exercise may have been tagged as false because it was no longer thought to be appropriate and the more positive evaluation was demonstrated (Petty et al., 2006). It may be that these participants are ready to be convinced about the importance of exercise and thus endorsed it more strongly. Given the ubiquity of messages regarding the importance of exercise for health in North American culture, it is very likely the participants had already heard many times about the importance of exercise for health. If so, from an APE model perspective, the pattern of results seen in the present research likely reflects affirmations of associations that were either weak or not already activated. These may be participants who don’t think about exercise very much or aren’t overly interested in the topic, an idea supported by their significantly lower MVPA at pretest than participants in the negative exercise reading conditions.

The long-term implications of this pattern of findings warrant further investigation. It is likely that repeated presentations would be needed to see a permanent shift congruent with the information such that, for example, one can change implicit associations of exercise as boring to exercise as fun (Rydell, McConnell, Strain, Claypool, & Hugenberg, 2007). Other researchers have reported lower explicit but not implicit attitudes in participants who viewed one short clip from the Biggest Loser, but it is unknown if the clip was congruent with, or counter to, already held attitudes (Berry et al., 2013). Therefore, one important question to ask is if repeated exposure to negative messages about exercise and has little other information to draw from (e.g., if one is a dedicated viewer of the Biggest Loser and is also inactive) results in lower implicit and explicit affective exercise-related attitudes. As noted by Rhodes et al. (2009), there is a paucity of research on interventions targeting affective attitudes. The current research showed that information that targeted
instrumental attitudes can influence implicit affective attitudes. These findings should be followed up with interventions designed to change attitudes over the long-term. In particular, examining implicit attitudes is of interest. Such attitude change occurs after repeated associations between cues and the attitude object (i.e., through evaluative conditioning; Gawronski & Bodenhausen, 2006). Intervention efforts may need to consider a paradigm such as implicit retraining that allows for such repeated pairings and has been shown to be successful in changing attentional bias in health behaviors such as smoking (e.g., Schoenmakers et al., 2010). Specific questions to ask are whether counter-attitudinal information results in opposite implicit cognitions and subsequent explicit attitudes over the long-term and whether positive attitudes can be further strengthened.

This study provides valuable information regarding the nature of implicit and explicit attitude change in the exercise domain. However, future research is needed to replicate these findings and to address limitations of the current study. One such limitation is the exclusively undergraduate student sample. It may be that other populations (e.g., older adults) have different associations of exercise and thus will have different implicit and explicit attitudes than those reported here. Further, it is possible that changes in explicit attitudes reflected response bias rather than actual changes in propositional reasoning. Future research is needed to replicate these findings and to account for the possibility of socially desirable responses when seeing changes in explicit attitudes. Another important consideration is that the messages used in this research were only moderately strong, which may affect message persuasiveness. Argument quality is most important when elaboration likelihood highest; that is, people process messages when it is easy to do so (Petty, Cacioppo, & Kasmer, 1988).

It is also likely that the information in the positive attitudes conditions was not new to the participants. However, other researchers have found that when messages for which people tend to have positive attitudes (waste management) were incongruent with stated values, argument strength made no difference in the results (von Borgstede et al., 2014). The two strongest messages presented (positive affective and control) did not yield any effects whereas the messages with relatively weaker argument quality did result in changes. Thus, an intriguing future direction is to replicate the current findings while manipulating message strength. If message strength is not effective for counter-attitudinal exercise-related messages there are implications for the effects of exercise messages that people profess not to believe as found by Berry et al. (2011). Finally, the one-week time frame between tests was adopted to avoid the mere-measurement effect and it is possible that pretest attitudes could have been affected over the course of the week. Replication with a shorter timespan between tests would also be of interest.

In conclusion, this study demonstrates the importance of considering how implicit cognitions may change as a result of reading exercise-related information, and the relationship between implicit and explicit attitudes. A strength of this research is using the APE model to guide hypotheses which highlights the need to use specific dual-processing theories, much as one would use appropriate theory when studying explicit attitudes. Research examining implicit cognitions in the exercise domain is just beginning and using appropriate theory to guide future research will aid in developing studies and interpreting findings with an aim to understand how best to positively influence exercise-related attitudes.

References


