EFFECTS OF EPISTEMIC AND TELEOLOGIC ATTITUDE CHANGE STRATEGIES

ON PERSISTENCE AND RESISTANCE OF SUBSEQUENT ATTITUDES

by

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TABLE OF CONTENTS

Vita

Abstract

LIST OF FIGURES

LIST OF TABLES

Effects of Epistemic and Teleologic Attitude Change Strategies on Persistence and Resistance of

Subsequent Attitudes

"If you can change your mind, you can change your life."

    William James

    People sometimes realize that they are not displaying as favorable attitudes, intentions, and behaviors as they should toward a self-beneficial activity. They can realize that they are not getting enough education for their future career success, saving enough money to buy a home, spending enough time with their families, or getting enough physical exercise to stay healthy. If the self-beneficial activity is considered important enough, an individual may be sufficiently motivated to behave more positively toward that activity.

    When people are motivated to treat a self-beneficial activity more favorably, they have many ways to do so. The transtheoretical model of behavior change (Prochaska & DiClemente, 1982, 1983; Prochaska, Velicer, Diclemente, & Fava, 1988), for instance, describes 10 specific processes of change that have been used successfully to decrease self-detrimental activities and increase self-beneficial activities. These processes of change are cognitions and actions that people perform as they progress through stages of change. The processes of change are consciousness raising, self-liberation, social liberation, self-reevaluating, environmental reevaluation, counterconditioning, stimulus control, reinforcement management, dramatic relief, and helping relationships. Many of these processes of change, like counterconditioning, stimulus control, and reinforcement management, involve acting on and changing the external environment. People who would like to exercise more, for example, could join a gym, recruit a workout buddy, buy an iPod, or post exercise reminders on the refrigerator. Such changes to the external environment can encourage changes in behavior.

Recent evidence suggests that it may also be possible to increase one's own self-beneficial activities without initially taking any overt actions at all, without even moving from an easy chair, through nothing more than cognitive restructuring (McGuire & McGuire, 1991, 1996). People can think themselves into displaying new, more positive attitudes (Resch & Lord, 2011), intentions (Lu, Lord, & Yoke, under review), and behaviors (Taylor et al., in press) toward a self-beneficial activity. This purely cognitive approach may not be as effective as getting out and doing something to change the external environment, but it has been shown to create change in attitudes, intentions, and behaviors.

How long do the results of such cognitive restructuring last? Are the new attitudes, intentions, and behaviors that are arrived at purely through cognitive restructuring strong enough to pass the tests of time, temptation, and attack? The answer to this question might depend on the type of strategy that is used to achieve the cognitive restructuring. Specifically, when people use relatively *epistemic* strategies of deliberate self-persuasion, their new post-persuasion attitudes, intentions, and behaviors might last longer and be more resistant to attack than had they instead used relatively *teleologic* strategies. The next section describes these two types of self-persuasion strategies.

Self-Persuasion Strategies

The approaches commonly used in cognitive restructuring have been grouped into two categories (Maio & Thomas, 2007). One type of self-persuasion—*epistemic* strategies—involves thinking through undesirable attributes of the topic under consideration and finding ways to make them more desirable, or at least less undesirable. People using these strategies may take a negative part of exercise, like getting sweaty, and think of it, for example, as evidence of progress or as a small price to pay for fitness. Another common route to self-

persuasion—*teleologic* strategies—involves controlling how accessible desirable and undesirable attributes are. This is accomplished through actions such as ignoring undesirable attributes or focusing on desirable attributes instead. Considering the previous example, getting sweaty, individuals using teleologic strategies would try to not think about how exercise involves sweating, or, they may think instead about how they'll look if they stick with their exercise goals instead. The next two sections describe epistemic and teleologic strategies in greater detail.

Epistemic Strategies

There are at least six ways of changing one's own attitudes, intentions, and behaviors through epistemic strategies. Epistemic strategies are specifically focused on changing the perception of the attitude object's attributes (see Table 1). This is accomplished by adjusting the attitude object's undesirable attributes until they appear more desirable or by strategically comparing the undesirable attributes to even less desirable ones to make them seem more positive by comparison.

Table 1

Epistemic Strategies for Attitude Change Toward "Exercise" with Examples

Strategy	Description	Example
Motivated Interpretation	Reinterpret undesired attributes into more desired attributes	Sweating during exercise means that you are getting a good workout
Motivated Integration	Reintegrate undesired attributes with desired attributes	Sweating also helps keep my body cool during exercise

3

Motivated Attribution	Reattribute undesired attributes to benign causal factors	Sweating is a completely normal response to exercise
Motivated Hypothesis Testing	Retest the validity of undesired attributes	I really don't even sweat that much when I exercise
Changing Comparators	Change the comparators for evaluating the attitude object	Sweating during exercise is not nearly as bad as dealing with diseases that come from an inactive lifestyle
Changing Dimensions	Change the dimensions on which the comparison is based	Exercise makes me feel more energized during the day and that is more important than dealing with sweat

Teleologic Strategies

In addition to the six epistemic strategies, there are also four ways of changing one's own attitudes, intentions, and behaviors through teleologic strategies. Teleologic strategies are result-oriented and function to modify the accessibility of the attitude object's positive and negative attributes in conscious awareness (see Table 2). By focusing on making desired or even irrelevant thoughts more accessible and undesired thoughts less accessible, the desirable attributes of the attitude object become the focus of attention, allowing for attitude change.

Table 2

Teleologic Strategies for Changing Attitudes Toward "Exercise" with Examples

Strategy	Description	Example
Suppression	Monitor to keep undesired attributes out of awareness	Try not to think about how sweaty exercise makes me
Distraction	Operate to keep undesired attributes out of awareness	Try instead to think about the movie I'm going to see later
Concentration	Operate to keep desired attributes in awareness	Think instead about how fit I'm becoming
Preemption	Monitor to keep desired attributes in awareness	Work to keep thoughts of sweating during exercise out of my mind while I'm thinking about more positive aspects of exercise

Further Differences Between Strategies

Epistemic and teleologic strategies differ not only in the methods by which the desired attitude is obtained, but in the constraints the individual places on that new attitude in terms of accuracy (Maio & Thomas, 2007). Individuals who prefer using epistemic strategies in cognitive restructuring alter the valence of attributes. They accomplish this by strategically thinking about undesirable attributes in such a way as to reduce their perceived validity or importance, while simultaneously increasing the perceived validity or importance of desirable attributes. This process results in desirable attributes that have the sign and semblance of accuracy to the individual.

People are not always interested in having an accurate attitude and may be more motivated by achieving the desired attitude regardless of validity. Teleologic strategies are preferred when attitude accuracy is not a high priority. Without perceived accuracy as a restriction, individuals achieve the end state of the desired attitude by changing the accessibility of desirable and undesirable attributes. Desirable elements are focused on and become more accessible, while undesirable elements are ignored and decrease in accessibility.

In addition, use of one of these two strategies makes using the other one impossible to pursue at the same time. Reinterpreting the meaning of "sweaty" to have a more positive connotation (an epistemic strategy), for instance, makes it impossible to simultaneously block the construct "sweaty" from conscious awareness, just as blocking it from awareness makes it impossible to perform simultaneously the cognitive work necessary to reinterpret the meaning of being "sweaty." Because people can do one or the other, but not both at the same time, chronic preferences for one or the other of the two strategies might form an individual difference continuum.

Individual Differences in Strategies

Individual differences in preference for attitude change strategy were theorized by Maio and Thomas (2007) and operationalized in a 30-item survey (Taylor et al., 2014) that when tested, revealed two highly reliable factors in the pattern theorized by Maio and Thomas (2007). Each of the 10 strategies, six epistemic and four teleologic, were described in three items, worded as first-person cognitions (e.g., Motivated Attribution: "I would judge X based on circumstances surrounding X and not necessarily blame X entirely."; Concentration: "I would concentrate on the positive qualities of X so that I don't think about the negative ones.").

6

Individuals tended to show a preference for either epistemic strategies or teleologic strategies across disparate attitude objects, and measures of test-retest reliability showed those preferences were stable across time, indicating that the E-T Scale measures stable individual differences in attitude change strategy preference.

The E-T Scale has also demonstrated satisfactory construct and predictive validity. In one study (Taylor et al., in press, Study 3), participants first listed five negative attributes of their lives, and then, while looking at the five negative attributes they had listed, tried to think themselves into adopting more positive attitudes toward their lives. In a subsequent surprise memory test administered 20 min after their lists of negative attributes had been collected, participants who had relatively epistemic E-T Scale scores recalled a larger number of those negative attributes than did participants who had relatively teleologic E-T Scale scores. In a follow-up study with basically the same procedure, participants with more epistemic E-T Scale scores recalled more of the negative attributes they had listed for "going to the counseling center" than did participants with more teleologic scores—a difference that was not predictable from any of several other individual difference scales.

Furthermore, the epistemic and teleologic strategies can be successfully taught. For instance, Resch and Lord (2011) taught participants to use either epistemic or teleologic strategies to change their attitudes toward a different attitude object. Then participants applied those strategies to improve their attitudes toward the target attitude object--Arabs. In the activity that followed, participants' attitudes toward Arabs were assessed. Participants were, indeed, using the strategies they had been taught and were able to improve their attitudes toward Arabs while using either set of strategies. Participants low in self-control who had been taught teleologic strategies, however, did not show improvement in their attitudes toward Arabs,

possibly because teleologic strategies require lasting self-control to avoid cognitive rebound (Wegner, 1994; Wegner, 2000; Wenzlaff & Wegner, 2000). This chink in the armor of teleologic strategies suggests that they may not produce new attitudes that are as strong as those produced by epistemic strategies.

Attitude Strength

Some empirical findings suggest that attitudes are both resilient (McGuire, 1985) and predictive of behavior (Ajzen & Fishbein, 1977; Glasman & Albarracin, 2006), whereas others suggest that attitudes are relatively mercurial (Chaiken & Yates, 1985) and only weakly correlated with behavior (Gollwitzer, 1996; Wicker, 1969). In such studies, the strength of an attitude is typically measured by its persistence over time and by its resistance to persuasion (Krosnick & Petty, 1995). Although strong attitudes are often both persistent and resistant, the two concepts are distinct and do not always co-occur (Haugtvedt, Schumann, Schneier, and Warren, 1994).

Persistence

An attitude's persistence is the degree to which that attitude, unchallenged over time, does not change (Petty, Haugtvedt, & Smith, 1995). Attitudes have been shown to be more persistent when they are personally relevant (Cook & Flay, 1978; Haugtvedt & Petty, 1990), if the individual anticipates communicating attitude-relevant information to others (Boninger, Brock, Cook, Gruder, & Romer, 1990; Chaiken, 1980), and if the individual has the ability and motivation to think about the attitude object (Petty, 1977). Attitude persistence is typically measured by computing the difference between two attitude assessments, separated by some amount of time, usually one to two weeks. An attitude is considered persistent if the change over time is minimal or absent.

Resistance

Resistance differs from persistence as a measure of attitude strength, as persistence tends to concern an unchallenged attitude. Resistance is a characteristic of strong attitudes that describes the propensity to resist explicit attacks (Petty, Haugtvedt, & Smith, 1995). This resilience, however, may be long lasting or short lived (Brehm, 1966). People are more likely to resist persuasive influences if initial counterarguments are weak (McGuire, 1961), if the topic is important (Boninger, Krosnick, Berent, & Fabrigar, 1995) or highly accessible (Smith, Fazio, Cejka, 1996; Houston & Fazio, 1989), and if those attitudes are connected with other beliefs and attitudes as part of a hierarchy in a cognitive structure (Eagly & Chaiken, 1993). An attitude may be considered strong if, after exposure to a persuasive attempt or attack, it changes minimally or does not change at all in the direction of a counterattitudinal message or other persuasive attempt.

Effects of Strategy Differences on Attitude Strength

As described earlier, individuals differ in their attitude-change strategy preferences. Although previous research has shown the immediate efforts at attitude-change through epistemic versus teleologic strategies to be equally effective (Resch & Lord, 2011; Taylor et al., in press), there may be differences between epistemic and teleologic strategies in measures of attitude strength over time. In the present research, epistemic strategies of deliberate self-persuasion were predicted to produce new attitudes with greater persistence and resistance than those produced by teleologic strategies. This prediction was derived from research on attitude importance, attitude accessibility, and attitude extremity.

Attitude Importance

The prediction that epistemic strategies of deliberate self-persuasion will produce stronger attitudes, those that are more persistent over time and more resistant to further change, can be derived from theories of effortful cognitive processing (Abelson, 1968) and from the cognitive dissonance principle of effort justification (Festinger, 1957; Festinger & Carlsmith, 1959), both of which address attitude importance. Individuals expend greater amounts of effort thinking about topics that they perceive as important (Boninger, Krosnick, Berent, & Fabrigar, 1995; Fiske & Neuberg, 1999; Cacioppo, Petty, Kao, & Rodriguez, 1986). Additionally, such effortful thinking leads to greater processing depth of the information and as a result, greater memory for the material (Craik & Tulving, 1975). One relevant study (Eagly, Kulesa, Brannon, Shaw-Barnes, & Hutson-Comeaux, 2000) found that when participants were exposed to counterattitudinal information on an important topic, they performed more effortful processing, reported thinking about the message more, and that those thoughts were opposite in valence to the counterattitudinal message. Reconceptualizing the meaning of an attitude object's attributes, as in epistemic strategies such as motivated interpretation, motivated hypothesis testing, and changing dimensions, appears as though it would take greater cognitive effort and processing depth than simply deciding not to think about those attributes, as in teleologic strategies such as suppression and distraction (see Tables 1 & 2).

If epistemic strategies require greater cognitive effort compared with teleologic strategies, then effort justification studies suggest that people might perceive the results of that effort (i.e., their new attitudes) as more personally important, because people consider the value of an outcome to increase as the effort required to obtain it increases (Aronson & Mills, 1959; Gerard & Mathewson, 1966; Tomkins, 1965). In a study of Taiwanese college students who had

a propensity to become addicted to online gaming, those who exerted more effort to convince their peers that an enjoyable computer game was, in fact, not entertaining, reported less positive attitudes toward online gaming compared with those participants who engaged in less effortful attempts to convey attitudinally-discrepant information (Wan & Chiou, 2010). Additionally, the high-effort participants rated themselves as less likely to become addicted to online gaming, suggesting they perceived their new attitudes as personally important.

Attitude importance, the personal significance and thoughtful concern an individual ascribes to an attitude (Krosnick, 1988), has been shown to predict both persistence of attitudes over time (Feldman, 1989; Schuman & Presser, 1981) and resistance of attitudes to change (Fine, 1957; Allyn & Festinger, 1961). Important attitudes are resistant to persuasive messages, as shown in a study where individuals who considered Canadian separatism an important issue were less likely to be persuaded to change their attitudes compared to those who did not find it an important issue (Gorn, 1975).

Time and effort spent engaging in the mental activity required for epistemic strategies may cause the thoughts, feelings, and behaviors associated with the attitude object to seem more important and may therefore lead to more persistent and resistant attitudes because of the heightened perceived importance of those new attitudes. Engaging in teleologic strategies such as distraction may have the unintended consequence of suggesting that the attitude object is less important. Based on these previous theories and empirical findings, epistemic strategies of deliberate self-persuasion might create new attitudes that are stronger than those created through teleologic strategies.

Attitude Accessibility

Further support for the expectation that epistemic strategies produce stronger attitudes is provided by theories of biased assimilation and ironic cognitive processes. Biased processing of attitude-relevant information depends on attitude accessibility (Houston & Fazio, 1989). When attitudes are highly accessible in memory, individuals process incoming information through the filter of those existing attitudes. One study (Young & Fazio, 2013) found that after repeatedly expressing their attitudes toward food taste-related words, thereby making those constructs more accessible, participants rated the likelihood of their eating less tasty food as lower than did participants who had expressed their attitudes towards body fitness-related words. Biased processing also results in more extreme attitudes (Lord, Ross, & Lepper, 1979). Specifically, biased assimilation involves accepting information that supports the desired attitude and rejecting information that conflicts with the desired attitude. Following biased processing of attitude-relevant information, individuals become more certain of their own position and more convinced that opposing arguments are faulty, weak, or irrelevant. Taking undesired attributes of the attitude object and rejecting them as unfounded or unimportant, as in epistemic strategies like motivated hypothesis testing and changing dimensions, is more similar to the processing that takes place during biased assimilation compared to ignoring undesired attributes and intentionally thinking of unrelated thoughts, as in teleologic strategies like distraction and suppression (see Tables 1 & 2). If epistemic strategies involve more biased assimilation, then the resulting, new attitudes should also be more accessible. Attitude accessibility has been shown to predict resistance to counter-attitudinal information and stability over time, leading to stronger attitudes (Fazio, 1995).

If teleologic strategies operate by keeping desired or irrelevant thoughts in awareness and undesired thoughts out of awareness, as suggested by the concept of a "push-down stack" (Wyer & Srull, 1986), then the avoided thoughts are presumably forced down in awareness by intentional focus on positive or irrelevant thoughts and so, for a time, the desired thoughts remain at the top of the "stack". Theories of ironic processes of mental control, however, would predict that it is difficult to maintain these processes more than temporarily (Wegner, 1994; Wenzlaff & Wegner, 2000). In the classic study demonstrating this effect, when told to avoid thinking about a white bear during a 5 min task, participants thought about the white bear more than once per min. Later when no longer trying to suppress thoughts of the white bear, those participants thought about the bear more often than others who were not given instructions to suppress thoughts of the bear during the first 5 min task (Wegner, Schneider, Carter, & White, 1987). If teleologic strategies result in the rebound effects seen in studies of ironic processes, then over time the resulting new attitude is likely to contain those same unwanted attributes that have been brought back to the top of the "stack" (i.e., made more accessible), resulting in attitudes that are less resistant to persuasion and less persistent over time.

Attitude Extremity

Theories of attitude-congruent selective exposure (Cotton, 1985; Festinger, 1957; Frey, 1986) and mere exposure effects (Bornstein, 1989) all of which address processes by which attitudes become more extreme, also bolster the prediction that epistemic strategies in deliberate self-persuasion will produce stronger new attitudes than teleologic strategies. When people are exposed to attitude-relevant information, they selectively attend to information that is all on one side of neutral (Frey & Wicklund, 1978; McGuire, 1957; Schwarz, Frey, & Kumpf, 1980) and that extreme information is better remembered (Roberts, 1985; Smith, Fabrigar, Powell, &

Estrada, 2007). Preference for epistemic or teleologic strategies does not affect the frequency

with which attitude-relevant information is present in the environment, obviously, but

individuals who prefer epistemic strategies work to make that information congruent with their

desired attitudes and thus more one-sided (Maio & Thomas, 2007). As a result of using

epistemic strategies, this increasingly congruent attitude relevant information becomes the focus

of attention. Alternatively, only one part of the teleologic corpus of strategies, concentration—a

feature positive search technique, is dedicated to keeping desired attributes of the attitude object

in awareness.

If epistemic strategies lead to more attitude-congruent information, which remains in

memory, then results of mere exposure effect studies would suggest that people may come to

evaluate that information more positively than the neutral point of an attitude scale whether it

takes the form of visual information such as Chinese characters (Zajonc, 1968) and brand logos

(Stafford & Grimes, 2012), or as a persuasive message (Cacioppo & Petty, 1989). In a study of

the mere exposure effect in visual imagery, participants viewed the well-known, ambiguous

rabbit-duck image repeatedly with instructions to either picture the figure as a rabbit or as a

duck. Later, when asked to rate their liking for two versions of the figure, one unambiguously a

rabbit and the other clearly a duck, participants gave the most favorable ratings to the image that

matched the image they were instructed to picture initially (Craver-Lemley & Bornstein, 2006).

Additionally, simply thinking about an attitude object over a period of time, as could be expected

when attitude-relevant information remains in memory, can lead to more extreme attitudes

(Tesser, 1978; Downing, Judd, & Brauer, 1992).

Attitude extremity, a component of attitude strength characterized by deviation from

neutrality (Abelson, 1995, in Petty & Krosnick, 1995), has been shown to predict resistance to

persuasive attempts (Ewing, 1942; Osgood & Tannenbaum, 1955) and behavioral consistency (Fazio & Zanna, 1978; Petersen & Dutton, 1975). New attitudes created using epistemic strategies may, therefore, be more extreme as well as more resistant to change and may lead to increased attitude-behavioral consistency.

<div align="center">

Self-Control as a Possible Moderator

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The relationship between strategy preference in deliberate self-persuasion and attitude strength may depend also on other variables. Although there is no difference predicted between epistemic and teleologic strategies in initial magnitude of change, differences in both the initial change and the rate of return to baseline attitudes after engaging in deliberate self-persuasion may be affected by other variables. Specifically, individual differences in self-control could affect the extent to which people change their attitudes and keep them changed.

Self-control has been described as, "the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from acting on them" (Tangney, Baumeister & Boone, 2004), and has been shown to predict desirable outcomes professionally (Baumeister, Stillwell, & Heatherton, 1994; Cox, 2000), academically (Duckworth & Seligman, 2005; Mischel, Shoda & Peake, 1988; Feldman, Martinez-Pons, & Shaham, 1995; Flynn, 1985; Wolfe & Johnson, 1995), and personally (Rohde, Lewinsohn, Tilson, & Seeley, 1990; Rusbult, Verette, Whitney, Slovik, & Lipkus, 1991). Self-control does not appear to affect all effortful cognitive tasks equally. Participants who worked complicated math problems did not show decreased self-control afterwards, but participants who spent the same amount of time engaged in a thought suppression exercise did (Muraven, Tice, & Baumeister, 1998). Additionally, depleted self-control has been shown to affect performance on vigilance tasks (Green & Rogers, 1995; Green, Rogers, Elliman & Gatenby, 1994; as cited in

Muraven & Baumeister, 2000), the very activity for which teleologic strategies are employed. Individuals low in self-control are more successful in changing their attitudes when they use epistemic strategies compared to teleologic strategies (Resch & Lord, 2011). Thus individuals who use teleologic strategies and are also low in self-control may temporarily suppress unwanted thoughts but may subsequently experience larger rebound effects (Wegner, 1994).

The Present Experiments

The different cognitive processes measured by the E-T scale have been predicted (Maio & Thomas, 2007), and shown (Resch & Lord, 2011; Taylor et al., in press) both to occur when individuals are attempting to change their own attitudes, and to be equally effective. Such empirical support, however, has been limited to time points following the manipulation with some immediacy (i.e., no more than 30 minutes). To date, no experiments have demonstrated the effect of these cognitive process differences on subsequent attitude strength; specifically, the persistence of changed attitudes over time or their resistance to further change. E-T scores, which measure individual differences in preference for different types of cognitive processes, may predict differences in the strength of attitudes attained through deliberate self-persuasion. Experiment 1 tested whether individuals who prefer epistemic strategies retain their new post-persuasion attitudes, intentions, and behaviors longer than do those who prefer teleologic strategies. Experiment 2 tested whether individuals who prefer relatively epistemic strategies resist subsequent normative influence better than do those who prefer relatively teleologic strategies.

<center>**Experiment 1**</center>

Overview

      To test whether preference for epistemic versus teleologic strategies predicts the persistence of attitudes derived from deliberate self-persuasion, the experimenter had participants spend 5 min trying to make their attitudes toward exercise more positive. All participants had earlier in the semester reported their baseline exercise attitudes, associations, and intentions. During the first session of the experiment, all participants reported their attitudes, associations, and intentions a second time, immediately after their 5 min of deliberate self-persuasion. During the second session 1 week after that, all participants reported their attitudes, associations, and intentions a third time. The hypothesis was that responses to these measures would remain more positive over time for participants who scored relatively epistemic on the E-T Scale than for participants who scored relatively teleologic on the E-T Scale, in other words that epistemic strategies of deliberate self-persuasion produce more persistent attitudes than do teleologic strategies.

Method

      Participants. A total of 128 undergraduate students (91 women, 37 men) participated for course credit. Students were selected for inclusion if they indicated on a prescreen survey currently exercising no less than one and no more than six times weekly. One participant was dropped from final analyses due to missing data in key independent variables.

      Procedure. The experiment consisted of three parts: a *prescreen* survey at the start of the semester, a *manipulation and immediate measurement* session occurring approximately 10 weeks after the prescreen survey, and a *delayed measurement* session 1 week after that.

Prescreen survey (baseline). As part of an online pretest conducted in the weeks prior to the experiment, students completed the E-T Scale (Taylor et al., in press; Appendix A) and several items related to the amount of exercise they perform and intend to perform, and their general attitudes toward exercise (Appendix B). The measures of interest were the *attitude* item "What is your attitude towards exercise" on an 11-point scale from -5 = very negative to 5 = very positive), the seven *association* items that make up the PACES scale (Kendzierski, & DeCarlo, 1991; hate vs. enjoy, no fun vs. lots of fun, tiring vs. energizing, unpleasant vs. pleasant, feel bad vs. feel good, not at all invigorating vs. invigorating, frustrated vs. not at all frustrated, no sense of accomplishment vs. strong sense of accomplishment, and rather be doing something else vs. rather be doing nothing else, all on 1 to 7 scales), and the intentions score (number of hours of exercise participants intended to do in the next versus the preceding four days).

Manipulation and immediate measurement session. Approximately 8 weeks later, the selected students were invited to participate in a study that was ostensibly unrelated to the pretest items they had previously answered. Upon arriving to the lab room, students were seated at individual computer terminals with an online survey program, which displayed the instructions and survey questions as well as recorded the responses. The experimenter explained to participants that the purpose of the study was to examine attitudes and behaviors in college students, specifically toward self-beneficial behaviors. This cover story was included to reduce differential responding based on knowledge of the hypothesis.

Deliberate self-persuasion manipulation. Participants first spent 5 min quietly contemplating how to improve their attitudes toward exercise (Appendix C). The deliberate self-persuasion manipulation was the same as used by Taylor and colleagues (2014), in which participants received the following instructions:

"We are studying deliberate self-persuasion. We want to know how people can make themselves adopt more positive attitudes. Today, we want you to make yourself have a more positive attitude toward exercise. You can use whatever thought processes you believe will be most useful in adopting a more positive attitude toward exercise. Your task, then, is to sit quietly in your chair for the next five minutes and use your mental processes to make yourself have a more positive attitude toward exercise. You can close your eyes if you want, or keep them open. It's entirely up to you."

Periodically during the self-persuasion activity the experimenter reminded participants that they should be spending that time trying to make their attitudes toward exercise more positive.

Immediate exercise attitudes and behaviors measurement. At the completion of the deliberate self-persuasion manipulation, all participants completed the same items from the prescreen survey regarding their exercise attitudes, associations, and intentions (see Appendix B). Finally, participants were thanked for their participation thus far and reminded about the time and location of Session 2.

Delayed measurement session. Participants returned to complete a delayed measurement session 1 week following the manipulation and immediate measurement session.

Delayed exercise attitudes and behaviors measurement. In this session participants completed the same exercise attitude, association, and intention items described previously.

Dispositional scales. Then participants were given four additional scales, presented in random order, that measured self-control, lay dispositionism, preference for consistency, and defensive confidence (Appendix D).

Suspicion probe and demographics. After completing the individual difference scales, participants answered items to probe for suspicion and to establish the extent of their attention to instructions during the experiment (Appendix E), followed by demographic items (e.g., age, sex, race; see Appendix F). Finally, participants had the experiment purpose fully explained to them (Appendix G) before being thanked for their participation and dismissed.

Results

Analytic strategy. This experiment included multilevel modeling as the primary analysis for hypothesis testing. Exercise behavior was assessed on three occasions, meaning each participant contributed multiple data points across time (Level 1) and those data points were nested within individuals (Level 2). Multilevel modeling was selected over repeated measures analysis of variance (ANOVA) for this analysis to account for any dependencies that exist in the multiple time points contributed by each participant. Separate analyses were performed for exercise attitudes, associations, and action intentions, measured over time, as outcome variables. The score from the self-control scale was also included as a Level 2 predictor variable as individual differences in self-control were expected to moderate the effects of E-T scores on change in exercise attitudes and behavior. Building from the unconditional model, time was added uncentered and with each progressive model, level-two continuous predictors were added grand-mean centered as they had no meaningful zero value. Restricted maximum likelihood (RML) was used in estimating variance and covariance parameters.

Preliminary Statistics. One participant was missing data for necessary Level-2 variables and was removed from the analyses. Before primary analyses were conducted, tests for significant main effects and interactions of categorical demographic variables such as sex on the three dependent variables (exercise attitudes, associations, and action intentions) at the individual

level were performed using ANOVAs on the data gathered at Time 1. Significant main or interaction effects of demographic variables, however, were not anticipated and not found. Table 3 shows means for the three measures at three time points (baseline, immediately after deliberate self-persuasion, and after a one week delay).

Table 3.

Means of dependent measures at three time points (Experiment 1).

Measure	Baseline	Immediate	Delayed
Attitudes	3.79 (1.75)	3.60 (1.49)	3.17 (1.82)
Associations	5.55 (1.02)	5.47 (.99)	5.46 (1.04)
Intentions	1.26 (1.52)	1.33 (1.26)	1.26 (1.26)

*Note. S*tandard deviations in parentheses.

Hierarchical linear modeling. To test whether preference for epistemic versus teleologic strategies of self-persuasion predicts persistence over time of attitudes reached through deliberate self-persuasion, analyses were conducted using two-level growth models that included tests of time, E-T Score, self-control, and the corresponding interactions. The baseline measure and the two post-manipulation observation events (immediate and 1 week post; Level 1, $n = 381$) were nested within participants (Level 2, $n = 127$). Observation events were coded as 0, 1, and 2, consistent with the baseline and two post-manipulation measurements, so the model intercept for each of the three dependent variables, exercise attitudes, associations, and action intentions, represented the initial positivity of attitudes or associations, or the difference between current exercise behavior and future exercise intentions, respectively, and the slope corresponded to any change that occurred over the three observation events. Random effects were estimated for both intercept and slope at the observation level (Level 1); testing whether individuals varied in their

baseline exercise attitude and association positivity, their current and intended future exercise behavior, as well as in the rate at which those values change over time. Random effects were also estimated for E-T score and self-control score, as well as their interaction (Level 2). The general mixed-model equations for this analysis were performed in the following order: unconditional model, unconditional linear growth model, conditional linear growth model, and final conditional linear growth model. All model results for each dependent variable are summarized in Tables 4-6. The equations that were used in both experiments for the unconditional model, unconditional linear growth model, conditional linear growth model, and final conditional linear growth model are shown in Appendix J.

Exercise attitudes. Table 4 and Figure 1 depict the results for exercise attitudes. Time was a significant predictor, with exercise attitudes becoming less positive as the semester progressed—a result consistent with that reported by Ten Eyck and associates (2008). Further inspection of Table 4, however, reveals that the main hypothesis was not supported. The non-significant Time x ET row of the table shows that post-self-persuasion attitudes of relatively epistemic participants were no more likely to persist over time than post-self-persuasion attitudes of relatively teleologic participants. In addition, there was no Time x ET x Self-Control interaction.

Table 4

Summary of Model Results Predicting Exercise Attitudes (Experiment 1)

Model Variable		*Coefficient*	*SE*	*t*-ratio
Unconditional	Intercept	3.52	0.12	29.82***
Linear Growth	Intercept	3.83	0.14	27.18***
	Time	-0.31	0.09	-3.37***
ET	Intercept	3.83	0.14	27.21***
	ET	0.14	0.13	1.12
	Time	-0.31	0.09	-3.39***
	Time*ET	0.12	0.08	1.41
SC	Intercept	3.83	0.14	27.13***
	ET	0.13	0.13	1.04
	SC	0.15	0.29	0.51
	Time	-0.31	0.09	-3.39***
	Time*ET	0.10	0.08	1.26
	Time*SC	0.19	0.18	1.01
ET*SC	Intercept	3.83	0.14	27.03***
	ET	0.64	0.97	0.66
	SC	0.28	0.38	0.73
	ET*SC	-0.15	0.29	-0.53
	Time	-0.31	0.09	-3.39***
	Time*ET	0.49	0.62	0.79
	Time*SC	0.29	0.24	1.17
	Time*ET*SC	0.12	0.19	-0.62

Note. ET = Epistemic-Teleologic scale score, SC = self-control.

*p ≤ .05. **p < .01. ***p < .001.

Figure 1. Change in exercise attitudes across time for relatively epistemic (+1 SD) versus relatively teleologic (-1 SD) participants high (+1 SD) versus low (-1 SD) in self-control (Experiment 1).

Exercise associations. Table 5 and Figure 2 depict the results for exercise associations, which were non-significant.

Table 5

Summary of Model Results Predicting Exercise Associations (Experiment 1)

Model Variable		Coefficient	SE	t-ratio
Unconditional	Intercept	5.50	0.08	68.27***
Linear Growth	Intercept	5.54	0.08	65.42***
	Time	-0.04	0.04	-1.01
ET	Intercept	5.54	0.09	65.21***
	ET	0.03	0.08	0.44
	Time	-0.04	0.04	-1.01
	Time*ET	0.03	0.04	0.93
SC	Intercept	5.54	0.09	65.04***
	ET	0.03	0.08	0.35
	SC	0.11	0.17	0.61
	Time	-0.04	0.04	-1.01
	Time*ET	0.03	0.04	0.83
	Time*SC	0.06	0.08	0.70
ET*SC	Intercept	5.54	0.09	65.19***
	ET	0.78	0.58	1.35
	SC	0.30	0.23	1.32
	ET*SC	-0.23	0.18	-1.31
	Time	-0.04	0.04	-1.00
	Time*ET	0.05	0.27	0.18
	Time*SC	0.06	0.11	0.58
	Time*ET*SC	-0.01	0.08	-0.08

Note. ET = Epistemic-Teleologic scale score, SC = self-control.

*p ≤ .05. **p < .01. ***p < .001.

Figure 2. Change in exercise associations across time for relatively epistemic (+1 SD) versus relatively teleologic (-1 SD) participants high (+1 SD) versus low (-1 SD) in self-control (Experiment 1).

Exercise intentions. Table 6 and Figure 3 depict the results for exercise intentions, which were non-significant.

Table 6.

Summary of Model Results Predicting Exercise Intentions (Experiment 1)

Model Variable		*Coefficient*	*SE*	*t*-ratio
Unconditional	Intercept	1.28	0.10	12.96***
Linear Growth	Intercept	1.28	0.13	10.26***
	Time	0.00	0.07	0.00
ET	Intercept	1.28	0.13	10.24***
	ET	-0.08	0.11	-0.69
	Time	0.00	0.07	0.00
	Time*ET	0.02	0.06	0.40
SC	Intercept	1.28	0.13	10.23***
	ET	-0.06	0.11	-0.56
	SC	-0.23	0.26	-0.90
	Time	0.00	0.07	0.00
	Time*ET	0.02	0.06	0.37
	Time*SC	0.02	0.13	0.16
ET*SC	Intercept	1.28	0.13	10.19***
	ET	0.08	0.86	0.09
	SC	-0.19	0.34	-0.56
	ET*SC	-0.04	0.26	-0.17
	Time	0.00	0.07	-0.02
	Time*ET	0.37	0.45	0.81
	Time*SC	0.11	0.18	0.62
	Time*ET*SC	-0.11	0.14	-0.77

Note. ET = Epistemic-Teleologic scale score, SC = self-control.
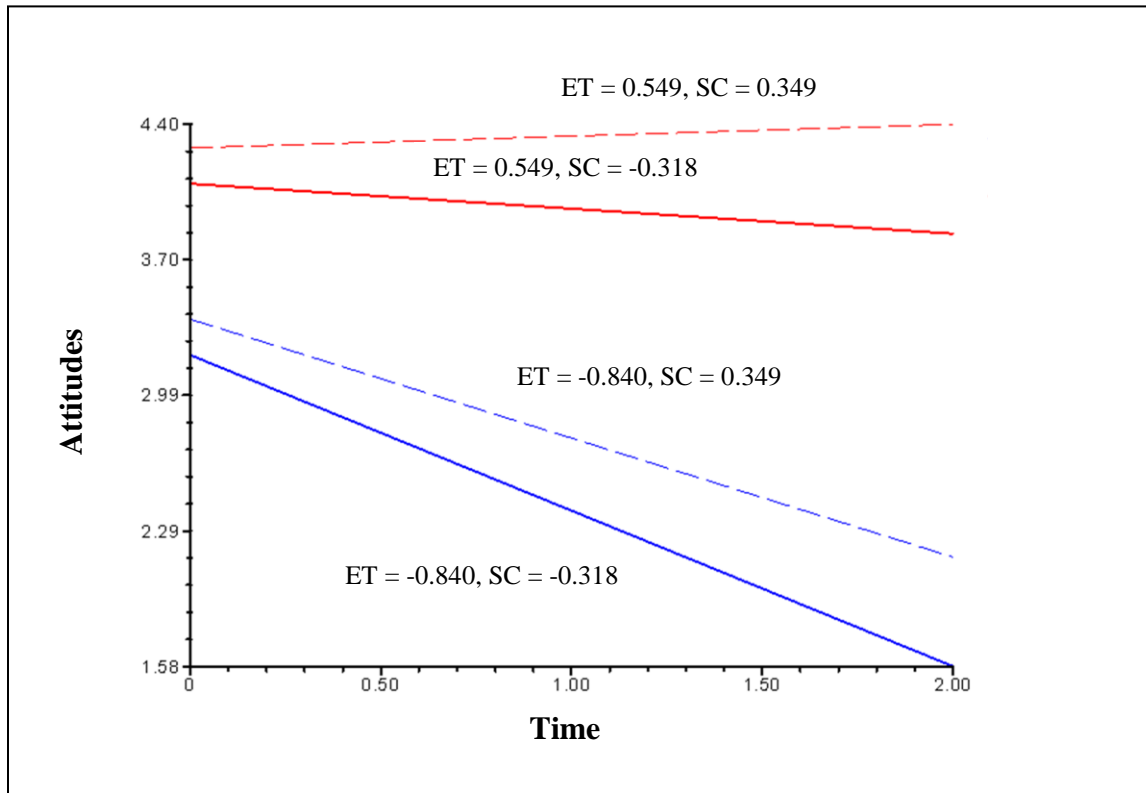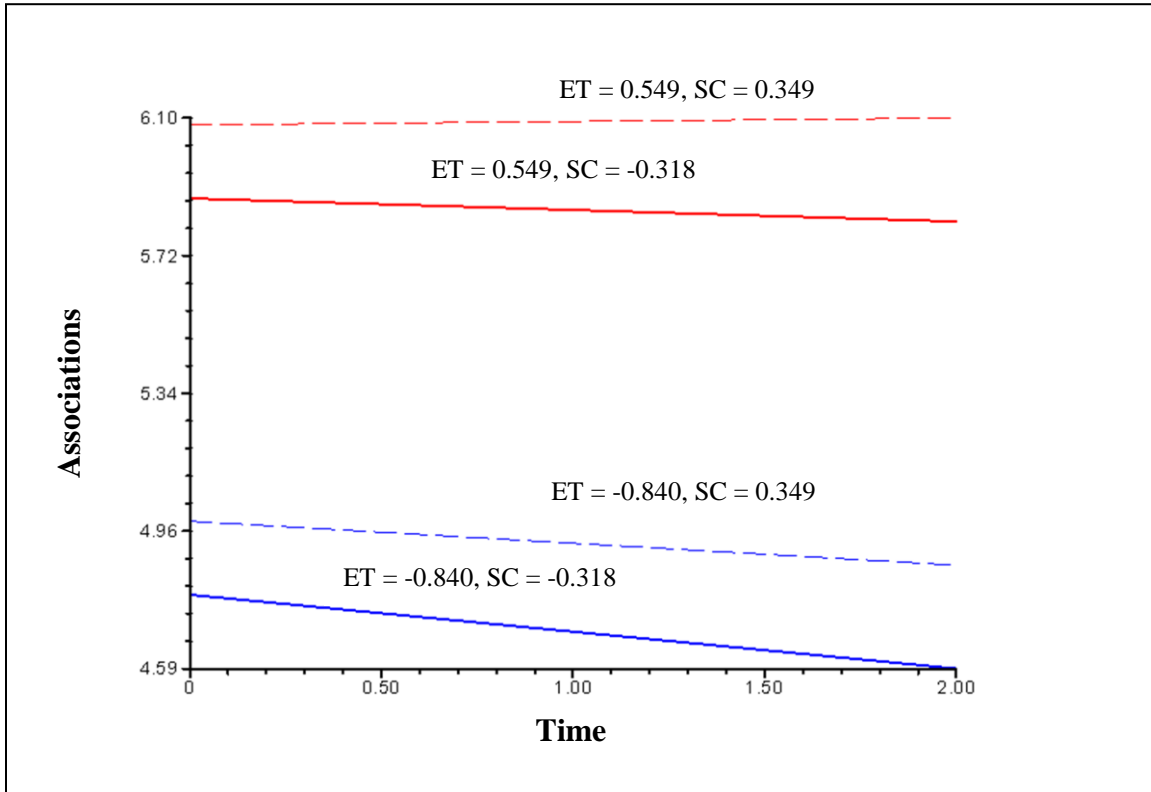
*p ≤ .05. **p < .01. ***p < .001.
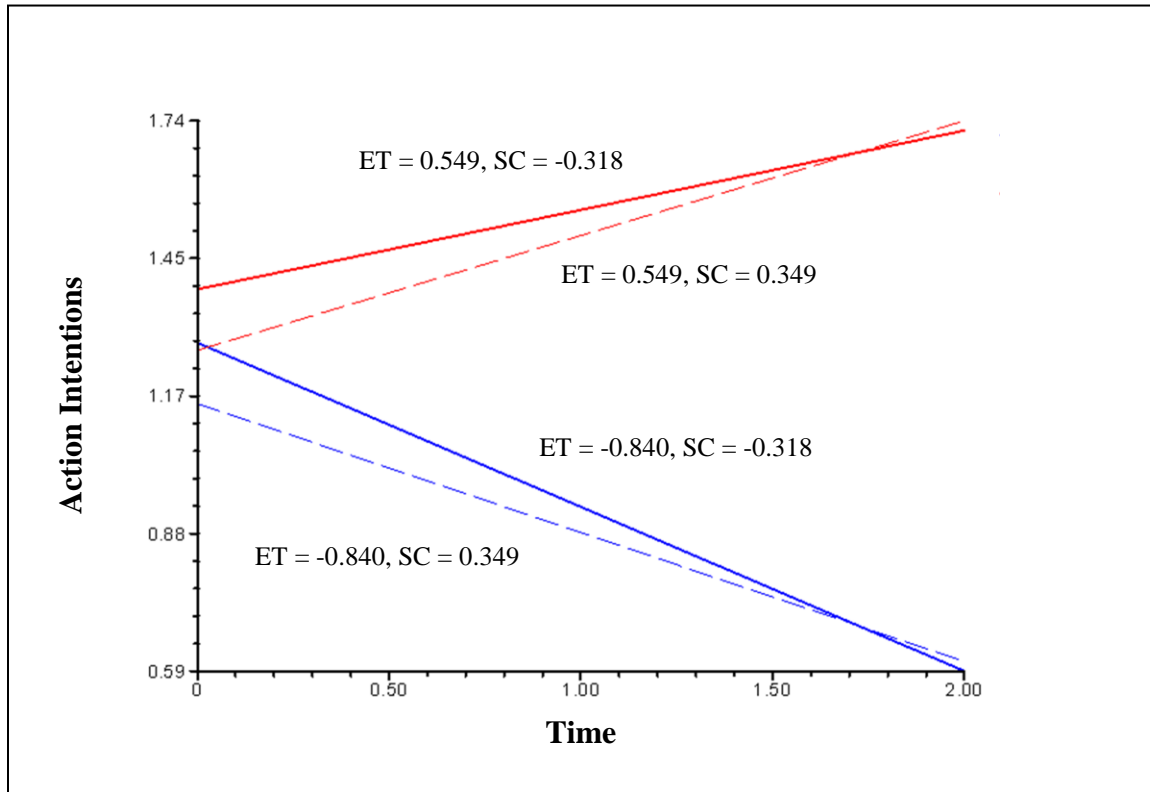
Figure 3. Change in exercise intentions across time for relatively epistemic (+1 SD) versus relatively teleologic (-1 SD) participants high (+1 SD) versus low (-1 SD) in self-control (Experiment 1).

Discussion

Based upon the theoretical background, it is possible that epistemic strategies do lead to longer lasting attitude change and that the methodology chosen for this experiment did not allow those differences to be captured. Modifications to the current design would allow for a more targeted examination of the effect of time. The selection of one-week as the delay time period was somewhat arbitrary. The optimal duration during which to observe attitude and behavior differences between epistemic and teleologic participants, should it exist, may be less or greater than one week. A daily diary study tracking participants' attitudes and attitude-relevant behaviors would determine if the hypothesized differences in attitudes and behaviors over time

exist and the optimal window of time for observing those differences.   Another consideration is the attitude object selected for examination. Testing attitude persistence as a measure of attitude strength through the passage of time was, in retrospect, a poor choice given the attitude object. Exercise as an attitude object is problematic in this sense as it is encountered in everyday social contexts. In the interim week between experimental sessions, participants were possibly viewing media that positively represented exercise, viewing their peers on campus dressed for and actively engaged in exercise, and conceivably talking with others about exercise. This likely, but unquantifiable exposure to the attitude object during the intervening week makes it very difficult to test the persistence of attitude change over time as practicality and ethics demand the release of experimental participants between the sessions. Thus, the lack of significant results becomes difficult to interpret. Revisions to the design of Experiment 1 would benefit by including an attitude object that is less frequently encountered in everyday contexts. With these careful modifications, differences between epistemic and teleologic strategies in attitude strength as measured by persistence may emerge.

In addition, it may be too much to expect a 5-minute session of deliberate self-persuasion to affect attitudes, associations, and behavioral intentions that are measured after a one-week delay. Maio and Thomas (2007) described studies in which deliberate self-persuasion affected measures taken as much as six months later (Simpson, Ickes, and Blackstone, 1995), but these studies were about changing attitudes toward a romantic relationship or romantic partner. It is likely that participants in these studies kept on using their cognitive strategies on a daily or almost daily basis throughout the future history of the relationship. Having decided, for instance, to reinterpret their partner's jealousy as "caring intensely" or to ignore thoughts of their partner's jealousy, these participants presumably had many subsequent opportunities to practice their

deliberate self-persuasion strategies until they became habitual. The present experiment differed from the studies reviewed by Maio and Thomas in that we did not deliberately afford participants repeated opportunities to practice their preferred strategies on negative thoughts about exercise during the week between the 5-minute intervention and the delayed measures of attitudes, associations, and behavioral intentions.

Finally, it is possible that individuals who prefer teleologic to epistemic strategies might not be more susceptible to having their new, post-deliberate self-persuasion attitudes changed by the mere passage of time, but they still might be differentially susceptible to having their new attitudes changed by a subsequent attack. Individuals who use epistemic strategies to achieve a new attitude have done the cognitive work necessary to reinterpret the cons of exercise as pros, so they are not likely to be affected by an attack that simply reminds them of those same "cons" that have become "pros." Once they have convinced themselves that "getting all sweaty is good for my health," for example, they have effectively prepared themselves themselves against future cues that remind them of the connection between exercise and "getting all sweaty." The process might be described as similar to "inoculation" against weak persuasive arguments (McGuire & Papageorgis, 1961). Individuals who use teleologic strategies to achieve a new attitude, in contrast, have not done any work to reinterpret negative aspects of the attitude object. The cons are still cons. Getting all sweaty is still undesirable for them. Any future attack on their new attitudes that cues associations to cons like "getting all sweaty" will catch them at a time when their defenses are down and they are not deliberately blocking such unwanted thoughts in the way they were during their 5-minute session of deliberate self-persuasion.

An experiment that contained a (disguised) attack on new post-deliberate self-persuasion attitudes, then, might still succeed in detecting differences between participants with different scores on the E-T Scale (Taylor et al., 2014).

Experiment 2

Overview

In addition to persistence, another component of attitude strength is resistance to attacks (Petty & Krosnick, 1995). A reasonable extension of Experiment 1 is resistance to change following exposure to normative information that suggests an opposite direction for attitudes than that sought during deliberate self-persuasion. In Experiment 2, E-T scores were expected to predict resistance to further attitude change after deliberate self-persuasion. The hypothesis was that participants with high E-T scores (relatively epistemic) would be more likely than those with low E-T scores (relatively teleologic) to resist shifting their post-self-persuasion attitudes to align with subsequent normative data that favored less positive attitudes.

In Experiment 2, as in Experiment 1, participants completed the deliberate self-persuasion task. Then, those participants were presented with normative data, ostensibly gathered from other students on campus, which suggested their peers' exercise attitudes were, on average, less than positive. The hypothesis was that participants with relatively epistemic scores on the E-T scale would be more resistant to the normative data than would participants with relatively teleologic scores.

Method

Participants. A total of 115 undergraduate students (99 women, 16 men) participated in this study for course credit. As in Experiment 1, students were selected for inclusion if they indicated on a prescreen survey currently exercising no less than one and no more than six times

weekly. Six participants were dropped from final analyses due to missing data in key independent variables.

Procedure. This experiment had two parts: a *prescreen* survey at the start of the semester and an experimental session during which the *deliberate self-persuasion manipulation, pre-norm measurement, normative data manipulation, and post-norm measurement* took place. This session occurred approximately 10 weeks after the prescreen survey. The procedure in Experiment 2 largely followed that of Experiment 1; participants spent 5 min attempting to make their attitudes toward exercise more positive before receiving normative data concerning other college students' exercise behavior and attitudes. Unlike Experiment 1, the experimental procedure all took place during one session, without a second wave of data collection occurring a week later. The dependent measures were all taken immediately after the normative manipulation.

Prescreen survey. Participants in Experiment 2 completed the same online pretest (see Appendices A and B) and were selected based on reported exercise behavior that fell within the range of accepted values used in Experiment 1.

Experimental session. Eligible students were invited to participate and upon arrival to the lab room, were seated at individual computer terminals. The experimenter presented the same cover story as described in Experiment 1.

Deliberate self-persuasion manipulation. Participants first engaged in 5 min of deliberate self-persuasion in which they attempted to increase their exercise attitude positivity, following the same instructions as in Experiment 1.

Pre-norm exercise attitudes and behavior measurement. Next, participants described their exercise attitudes, associations, and intentions using the same prescreen survey questions described previously (see Appendices A and B).

Filler task. To allow sufficient time between completing the pre-manipulation attitude and behavior items and beginning the normative data manipulation, participants completed a filler task in which they spent 5 min describing what comes to mind when they think about several foreign countries (Appendix H).

Normative data manipulation. Participants were then told:

> "We thought you'd be interested in the responses that other students at TCU have given for the same items that you recently completed. We are also interested in how well you will remember the other students' responses so look them over carefully- there will be a recall test later in the study to see if you were able to remember the general patterns in the responses."

The responses participants saw (Appendix I) had supposedly been gathered from 1,363 undergraduate students who completed the same pretest items; however, the pattern of responses was altered to suggest the modal attitude toward exercise was neutral, but that a greater number of students indicated negative responses than positive responses. Similarly, exercise behavior responses were modified to indicate most other students were exercising around once per week and for one hour or less, which was far below the actual responses from the pretest. These fictitious "norms" were presented as a subtle way to make participants' attitudes (reported immediately after deliberate self-persuasion) less positive. Fictitious norms have successfully altered attitudes in previous studies (e.g., Asch, 1956)

Participants were instructed to examine these items and to remember, in general, how other students were responding. A recall test was not given at any point in the study but was mentioned in the instructions to encourage participants' active attention. Additionally, to ensure participants were attending to the fictitious normative data, they were asked to pick the response that was selected most often by other students (Appendix J).

Post-norm exercise attitudes and behavior measurement. After viewing and responding to the normative data, participants again completed the exercise attitude, association, and intention items before answering the same individual difference measures as in Experiment 1 (i.e., self-control, lay dispositionism, preference for consistency, and defensive confidence; see Appendix D), and responding to the suspicion and demographic items (see Appendices E and F). Finally, the actual aims of the study (see Appendix G) were revealed to them before they were thanked and dismissed.

Results

Preliminary Statistics. Six participants were missing data for necessary Level-2 variables and were removed from the analyses. Before primary analyses were conducted, tests for significant main effects and interactions of categorical demographic variables such as sex on the three dependent variables (exercise attitudes, associations, and action intentions) at the individual level were performed using ANOVAs on the data gathered at Time 1. Significant main or interaction effects of demographic variables, however, were not anticipated and not found. Table 7 shows means for the three measures at three time points (baseline, immediately after deliberate self-persuasion, and post-norms). The baseline measure, the post-manipulation observation event, and the post-norms observation event (Level 1, $n = 345$) were nested within participants (Level 2, $n = 115$).

Table 7.

Means of dependent measures at three time points (Experiment 2).

Measure	Baseline	Immediate	Post-norms
Attitudes	3.61 (1.69)	3.31 (1.37)	3.01 (1.90)
Associations	5.42 (1.16)	5.37 (1.05)	5.32 (1.37)
Intentions	1.56 (1.90)	-1.36 (1.16)	-1.16 (1.58)

*Note. S*tandard deviations in parentheses.

Exercise attitudes. Table 8 and Figure 4 depict the results for exercise attitudes. The Time x ET row in the bottom section of Table 8 shows that the basic hypothesis—post-self-persuasion attitudes of relatively epistemic participants would resist normative pressure better than those of relatively teleologic participants—was supported. That effect, however, was qualified by a significant Time x ET x Self-Control interaction. As suggested by Figure 4, attitudes of participants high (+1 SD) versus low (-1 SD) on E-T and Self-Control scores did not differ at baseline (Time 0 in the figure; $B = 0.09$, $SE = 0.38$, $t = 0.23$) or post-self-persuasion (Time 1 in the figure; $B = 0.38$, $SE = 0.33$, $t = 1.17$), but they did differ post-norms (Time 2 in the figure; $B = 0.85$, $SE = 0.43$, $t = 2.00$). Participants who preferred relatively epistemic strategies of deliberate self-persuasion and were relatively high in self-control resisted normative pressure on their attitudes best, whereas participants who preferred relatively teleologic strategies of deliberate self-persuasion and were relatively low in self-control resisted normative pressure on their attitudes least.

Table 8.

Summary of Model Results Predicting Exercise Attitudes (Experiment 2)

Model Variable		*Coefficient*	*SE*	*t*-ratio
Unconditional	Intercept	3.28	0.14	22.86***
Linear Growth	Intercept	3.62	0.17	21.85***
	Time	-0.34	0.10	-3.52***
ET	Intercept	3.62	0.16	22.21***
	ET	-0.36	0.16	-2.19*
	Time	-0.34	0.10	-3.53***
	Time*ET	0.11	0.10	1.14
SC	Intercept	3.62	0.15	23.70***
	ET	-0.45	0.16	-2.89**
	SC	1.42	0.35	4.09***
	Time	-0.34	0.10	-3.51***
	Time*ET	0.12	0.10	1.19
	Time*SC	-0.09	0.22	-0.42
ET*SC	Intercept	3.61	0.16	22.97***
	ET	-0.74	1.26	-0.59
	SC	1.34	0.51	2.62**
	ET*SC	0.09	0.38	0.23
	Time	-0.30	0.10	-3.04**
	Time*ET	1.66	0.79	2.10*
	Time*SC	0.37	0.32	1.14
	Time*ET*SC	-0.47	0.24	-1.97*

Note. ET = Epistemic-Teleologic scale score, SC = self-control.
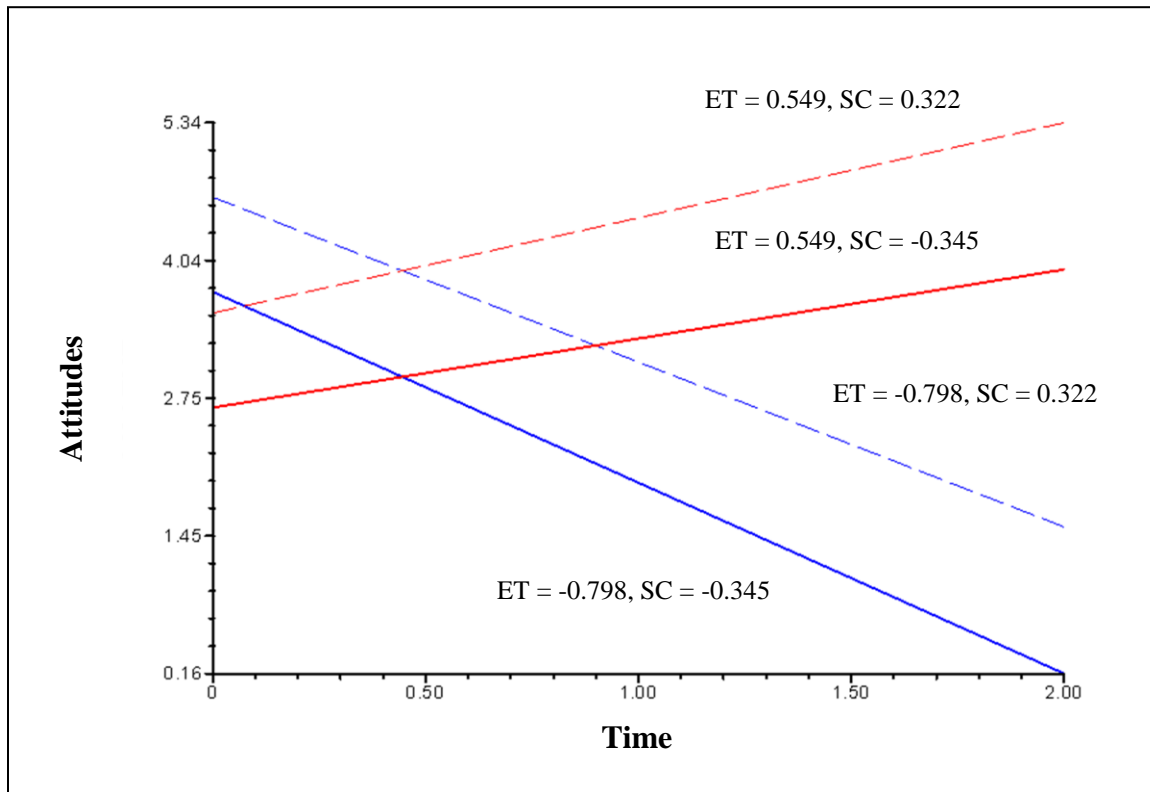
*p ≤ .05. **p < .01. ***p < .001.

Figure 4. Change in exercise attitudes across time for relatively epistemic (+1 SD) versus relatively teleologic (-1 SD) participants high (+1 SD) versus low (-1 SD) in self-control (Experiment 2).

Exercise associations. Table 9 and Figure 5 depict the results for exercise associations. The Time x ET row in the bottom section of Table 9 shows that the basic hypothesis—post-self-persuasion associations of relatively epistemic participants would resist normative pressure better than those of relatively teleologic participants—was supported. That effect, however, was qualified by a significant Time x ET x Self-Control interaction. As suggested by Figure 5, attitudes of participants high (+1 SD) versus low (-1 SD) on E-T and Self-Control scores did not differ at baseline (Time 0 in the figure; $B = 0.06$, $SE = 0.27$, $t = 0.20$) or post-self-persuasion (Time 1 in the figure; $B = 0.45$, $SE = 0.24$, $t = 1.85$), but they did differ post-norms (Time 2 in the figure; $B = 0.84$, $SE = 0.32$, $t = 2.59$). As with exercise attitudes, participants who preferred relatively epistemic strategies of deliberate self-persuasion and were relatively high in self-control resisted normative pressure on their associations best, whereas participants who preferred relatively teleologic strategies of deliberate self-persuasion and were relatively low in self-control resisted normative pressure on their associations least.

The Time x SC row in the bottom section of Table 9, combined with the graphical display in Figure 5, suggests that individuals high in self-control resist normative pressure on their exercise associations better than do individuals low in self-control, but that finding was not predicted. Nonetheless, these results are consistent with previous demonstrations of rebound effects when individuals low in self-control attempt to use teleologic strategies for deliberate self-persuasion (Resch & Lord, 2011).

Table 9.

Summary of Model Results Predicting Exercise Associations (Experiment 2)

Model Variable		Coefficient	SE	t-ratio
Unconditional	Intercept	5.30	0.11	48.17***
Linear Growth	Intercept	5.40	0.11	48.97***
	Time	-0.08	0.07	-1.08
ET	Intercept	5.42	0.11	51.15***
	ET	-0.28	0.10	-2.71**
	Time	-0.09	0.07	-1.20
	Time*ET	0.09	0.07	1.30
SC	Intercept	5.42	0.11	51.48***
	ET	-0.31	0.11	-2.92**
	SC	0.38	0.24	1.58
	Time	-0.08	0.07	-1.20
	Time*ET	0.07	0.07	1.06
	Time*SC	0.27	0.16	1.68
ET*SC	Intercept	5.42	0.11	49.41***
	ET	-0.13	0.91	-0.14
	SC	0.44	0.36	1.21
	ET*SC	-0.06	0.27	-0.20
	Time	-0.05	0.07	-0.64
	Time*ET	1.36	0.59	2.32*
	Time*SC	0.65	0.23	2.79**
	Time*ET*SC	-0.39	0.18	-2.20*

Note. ET = Epistemic-Teleologic scale score, SC = self-control.
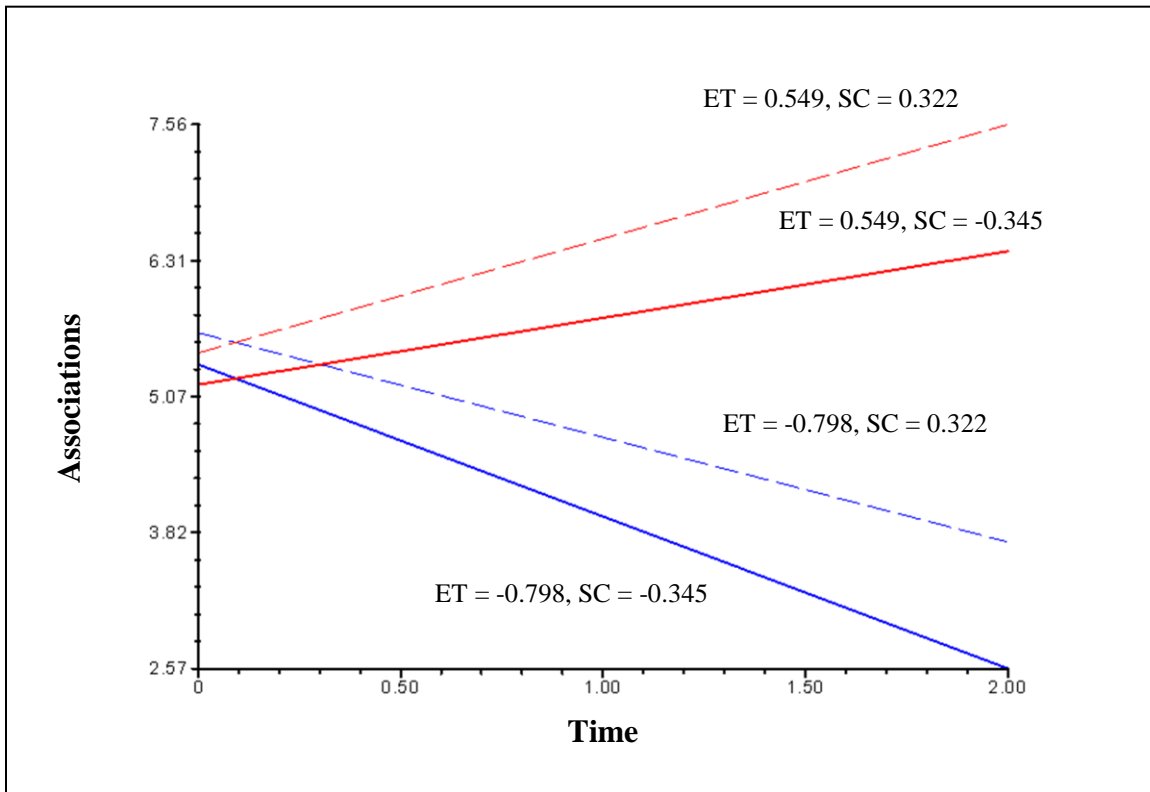
*p ≤ .05. **p < .01. ***p < .001.

Figure 5. Change in exercise associations across time for relatively epistemic (+1 SD) versus relatively teleologic (-1 SD) participants high (+1 SD) versus low (-1 SD) in self-control (Experiment 2).

Exercise intentions. Table 10 and Figure 6 depict the results for exercise intentions. The Time x ET row in the bottom section of Table 10 shows that the basic hypothesis—post-self-persuasion associations of relatively epistemic participants would resist normative pressure better than those of relatively teleologic participants—was supported. That effect, however, was qualified by a significant Time x ET x Self-Control interaction. As suggested by Figure 6, attitudes of participants high (+1 SD) versus low (-1 SD) on E-T and Self-Control scores did not differ at baseline (Time 0 in the figure; $B = 0.22$, $SE = 0.44$, $t = 0.50$) or post-self-persuasion (Time 1 in the figure; $B = 0.31$, $SE = 0.28$, $t = 1.10$), but they did differ post-norms (Time 2 in the figure; $B = 0.84$, $SE = 0.37$, $t = 2.29$). As with exercise attitudes and associations, participants who preferred relatively epistemic strategies of deliberate self-persuasion and were relatively high in self-control resisted normative pressure on their exercise intentions best, whereas participants who preferred relatively teleologic strategies of deliberate self-persuasion and were relatively low in self-control resisted normative pressure on their exercise intentions least.

The Time x SC row in the bottom section of Table 10, combined with the graphical display in Figure 6, suggests that individuals high in self-control resist normative pressure on their exercise intentions, as well as their exercise associations, better than do individuals low in self-control, but that finding was not predicted. Nonetheless, this ability of post-self-persuasion attitudes to resist further change in exercise intentions, when combined with a similar pattern of results for exercise associations, fits well with previously reported results (Resch & Lord, 2011).

Table 10.

Summary of Model Results Predicting Exercise Intentions (Experiment 2)

Model Variable		*Coefficient*	*SE*	*t*-ratio
Unconditional	Intercept	-1.33	0.11	-11.89***
Linear Growth	Intercept	-1.54	0.17	-9.07***
	Time	0.15	0.12	1.29
ET	Intercept	-1.55	0.17	-9.28***
	ET	0.32	0.16	1.97*
	Time	0.16	0.12	1.33
	Time*ET	-0.09	0.12	-0.78
SC	Intercept	-1.54	0.17	-9.12***
	ET	0.34	0.17	2.03*
	SC	-0.20	0.39	-0.50
	Time	0.15	0.12	1.33
	Time*ET	-0.14	0.12	-1.19
	Time*SC	0.67	0.26	2.52*
ET*SC	Intercept	-1.56	0.18	-8.90***
	ET	-0.39	1.47	-0.27
	SC	-0.42	0.58	-0.72
	ET*SC	0.22	0.44	0.50
	Time	0.20	0.12	1.73
	Time*ET	1.60	0.98	1.63
	Time*SC	1.19	0.39	3.06**
	Time*ET*SC	-0.53	0.30	-1.79†

Note. ET = Epistemic-Teleologic scale score, SC = self-control.

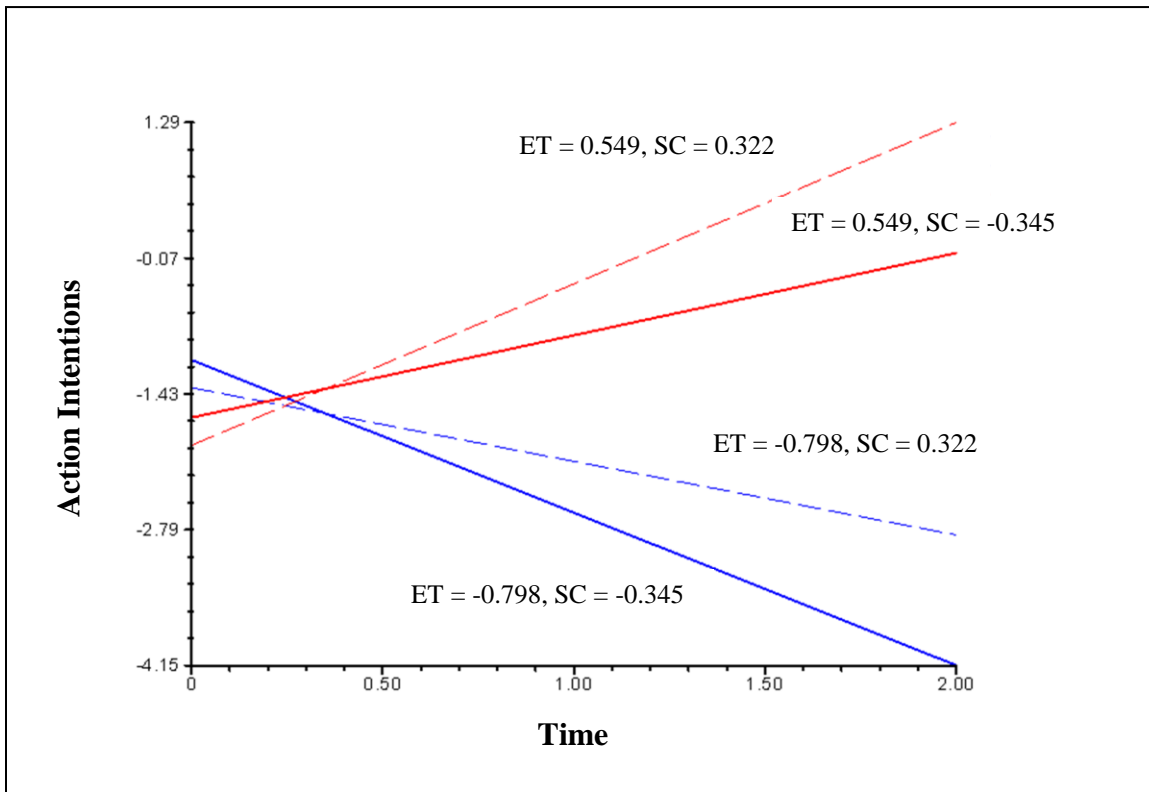†*p* < .08. **p* ≤ .05. ***p* < .01. ****p* < .001.

Figure 6. Change in exercise intentions across time for relatively epistemic (+1 SD) versus relatively teleologic (-1 SD) participants high (+1 SD) versus low (-1 SD) in self-control (Experiment 2).

General Discussion

People can often identify when they are not acting in their own best interests, as evidenced by the popularity of New Year's resolutions, diet plans, and 24-hour gyms. At such times, individuals may want to change their own attitudes toward self-beneficial activities. The purpose of the current experiments was to explore cognitive strategies that are effective for bringing about lasting attitude change. Experiment 1 detected no difference between epistemic and teleologic strategies for maintaining attitude change after 1 week. In Experiment 2, however, epistemic strategists were better able to maintain their new attitudes in the face of contradictory peer norms than were teleologic strategists. Teleologic strategists were especially likely to revert to their former attitudes if they were also low in self-control.

The current findings build upon the results of previous research in a number of ways. Specifically, for example, Resch and Lord (2011) found a relationship between type of strategy (epistemic vs. teleologic) used and attitude change with self-control as a moderator. In their study, however, individual preferences for epistemic or teleologic strategies were not measured, only manipulated. Additionally, there was no attack on participants' newly created attitudes; therefore no conclusions about attitude strength could be drawn. The results from Experiment 2 built on the findings from Resch and Lord by measuring preferences for self-persuasion strategy and including a normative manipulation. These additions demonstrated the differences in attitude strength between the strategies and provided more evidence for the role of self-control as a moderating factor.

The current Experiment 2 not only contributes to the existing body of research on deliberate self-persuasion as a concept, but also to its measurement as an individual difference. As suggested by previous research (Taylor et al., 2014) and further confirmed in Experiment 2,

preference for epistemic and teleologic strategies for the purpose of self-persuasion can be thought of as an individual difference and people appear to fall on a continuum between highly epistemic and highly teleologic. Experiment 2 lends further credence to the E-T Scale as a valid measure of the self-persuasion method individuals' use. Beyond confirming individual difference measures, this research adds to what is currently known about the E-T Scale, which is that it can predict who is likely to be affected by peer norms after changing their attitudes. Being able to anticipate who will backslide after a directed thinking intervention holds great practical value. Another value-added aspect of the current research is the demonstrated interaction with the personality trait, self-control. This interaction further singles out individuals who are most susceptible to deterioration of their new attitudes.

Measuring E-T preference as an individual difference measure suggests that it has properties of other personality traits, but operates at a different level. As Taylor and associates (2014, p. 189) noted, the E-T scale "has the potential to help facilitate a more integrative perspective that mediates between basic level traits and relatively context-dependent motivations." Research has shown that people can be taught to use either teleologic or epistemic strategies and that they can be successful in changing their attitudes using the learned strategy (Resch & Lord, 2011). Their study did not test if the newly learned strategy persisted past the initial manipulation to affect future attitude change attempts. It is possible, then, that changing the strategy preference of a strongly epistemic or teleologic person may be difficult but not impossible. The results of Experiment 2 suggest the best defense against degradation of newly changed attitudes is to use epistemic strategies to change those attitudes initially. Strongly teleologic individuals may find it hard to change the strategy they use, so it might be best for

those individuals to work within their preferred strategy, at least if they have a reasonable level of self-control.

The current research also adds to what is currently known about self-control. Within the process of self-directed attitude change the ultimate goal of attitude change in the desired direction is the same regardless of which strategy is used to achieve those ends. Those ends are, however, affected by self-control, leading individuals with more self-control to realize the goal of attitude change in a way that provides them with protection from persuasion against the newly formed attitudes. An indirect route that would likely increase teleologic participants' success in maintaining their new attitudes after facing persuasive attempts involves manipulating self-control. Dispositional capacity for self-control is not an ultimate limiting factor as individuals can learn to conserve, replenish, and increase their self-control (Twenge & Baumeister, 2002). Used alone or in conjunction with efforts to improve teleologic strategies like suppression or preemption, manipulating self-control is a potentially beneficial approach.

Limitations

Although the current studies have several methodological strengths (e.g., longitudinal design, behavioral intentions), there are aspects of the study design that may still be improved upon. For instance, in Experiment 1, testing attitude persistence as a measure of attitude strength through the passage of time was, in retrospect, a poor choice given the attitude object. Exercise as an attitude object is problematic in this sense as it is encountered in everyday social contexts. In the interim week between experimental sessions, participants were possibly viewing media that positively represented exercise, viewing their peers on campus dressed for and actively engaged in exercise, and conceivably talking with others about exercise. This likely, but unquantifiable exposure to the attitude object during the intervening week makes it very difficult

to test the persistence of attitude change over time. Another limitation of Experiment 1 was the

length of time between sessions. Selecting 1 week as the delay was somewhat arbitrary. It

remains possible that differences between epistemic and teleologic strategies may have been

observable at some time that did not fall precisely 1 week after the manipulation. One week may

have been too much time, or too little. Thus, the lack of significant results becomes difficult to

interpret.

Another limitation with this research was the lack of a manipulation check to determine

the believability of the normative manipulation (Experiment 2). Did the participants truly

believe their peers were neutral to negative in their attitudes toward exercise? The results would

suggest that they did but a measure of the degree to which participants thought the peer norms

were accurate would further support the conclusions drawn from the results. Furthermore,

preference for epistemic and teleologic strategies was measured but not manipulated. Using

strategy as a randomized variable would eliminate causal ambiguity in the relationship between

strategy, self-control, and attitudes (Judd & Kenny, 2010). The current interpretation of the

results is based on theory and common sense. Teaching people to use either epistemic or

teleologic strategies and measuring the persistence of their attitudes and the resistance of those

attitudes to change would lend further confidence to the interpretation of the current results.

Future research can address the questions posed by the confines of the current methodology and

extend these findings to other areas.

Future Directions

The limitations of the current studies combined with new areas of research provide many

interesting future directions for study. Teaching participants to use either epistemic or teleologic

strategies and measuring the persistence and resistance of their new attitudes would address

questions about each strategy and its relationship to attitude strength beyond the individual's intrinsic strategy preference. In addition, if participants' strategy preference was measured, this line of research could determine if teleologic individuals can be taught epistemic strategies and use them successfully beyond the initial self-persuasion event to affect attitude strength. The interaction of self-control and strategy preference is another fascinating area for further exploration. Measurement and manipulation of self-control and related constructs like impulse control and delay of gratification is a promising research direction; in addition to teaching people to use epistemic strategies to improve attitude strength. They could possibly be taught to increase self-control and similar concepts to that same end. In this way, future research could demonstrate reversing the results of Experiment 2 for teleologic individuals low in self-control.

Other research directions worth consideration stem from the normative manipulation used in Experiment 2. What was brought to mind by the normative manipulation is not currently known. There is research to suggest that what was brought to mind for epistemic strategists during the presentation of the norms may be different than what the teleologic strategists experienced (Asch, 1946). People interpret group norms in ways that confirm what they already believe. Epistemic individuals who saw that their peers were not positive toward exercise may have assumed that their peers were thinking about different kinds of exercise than they themselves were. This assumption would allow epistemic individuals to maintain the positive attitudes they previously established. The reason epistemic strategy participants could do this is because they had already changed the meaning of the undesirable qualities of exercise before they encountered the norms.

The teleologic strategy participants, in contrast, had successfully banished their undesirable thoughts from awareness. The group norm presentation was subtle and participants

were unlikely to have even considered that the information they were viewing could have been persuasive and therefore did not attempt to protect their new attitudes from the information. Epistemic strategists were prepared by nature of their strategy and are assumed to have integrated these false norms into their mental representation of exercise in a way that allowed them to maintain the positivity they previously generated. Teleologic strategists, however, had ceased their self-persuasion efforts and were possibly in a relaxed state when the group norms were presented. This would have allowed the normative information to quietly infiltrate their awareness and render undesirable associations to exercise more accessible from memory, resulting in attitudes that are less positive than they were immediately after self-persuasion.

If this is indeed the underlying process, then it is possible that other types of persuasion will affect epistemic and teleologic strategists differently. An overt persuasive message, aimed at eroding the confidence epistemic individuals have in the altered meanings they have created for undesirable attributes, may be successful in eroding their new attitudes. A persuasive message of this sort may leave the teleologic strategists' new attitudes relatively unscathed because in the face of such a direct persuasive attempt, teleologics with even moderate self-control could be expected to reassert their cognitive control efforts to quell the rising undesirable cognitions.

Concluding Remarks

Despite these limitations, this line of research on the cognitive strategies used for deliberate self-persuasion is important and has practical and clinical applications. For instance, according to the Centers for Disease Control and Prevention (CDC; 2013), approximately 17% of the youth in the United States are obese. Based on the current research, the inclusion of self-directed attitude change education could be an effective cognitive strategy to add to this existing

set of tools. Using the E-T scale and self-control scale as screening measures, the individuals most likely to lose the message and succumb to the goading of their peers can be identified and targeted for further intervention. Along these same lines, Rational and Emotive Cognitive Behavioral Therapy (CBT; Ellis, 1955) proposes two common types of therapy that include interventions aimed at either reinterpreting or blocking unwanted thoughts. The E-T scale and a measure of self-control may be useful in this setting to identify clients at greater risk for losing the improvements brought about by therapy. Youth and individuals undergoing CBT are just two of the groups who could potentially be helped through extending this research further. The theoretical contribution of this research to the body of work on deliberate self-persuasion and the potential practical applications speak to its value and the merit of future projects intended to continue this line of work.

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Appendix A

Suppose that you wanted to develop a more positive attitude toward something. We want to know about your strategies in general, <u>not</u> about a specific person or thing. So we are going to use "X" to stand for the abstract concept of anything you might want to change your attitudes toward. Knowing what you do about yourself and about the strategies that you use in everyday life, how likely would you be to use each of the following strategies? Please rate each strategy on the following scale:

-3	-2	-1	00	+1	+2	+3
very unlikely to			**neither likely nor**			**very likely to use**
use this strategy			**unlikely**			**this strategy**

1. _____I would think that X has some undesirable characteristics, but those are tied to many desirable characteristics.

2. _____I would recognize that things I initially viewed as weaknesses about X are really a part of what makes X unique.

3. _____I would judge X based on circumstances surrounding X and not necessarily blame X entirely.

4. _____I would ask questions that would validate a positive opinion of X.

5. _____I would realize that X is actually pretty good compared to the average group.

6. _____I would remind myself that X is desirable in all the ways that really matter.

7. _____I would concentrate on the positive qualities of X so that I don't think about the negative ones.

8. _____I would engage my mind in another activity each time I remembered a negative quality of X.

9. _____I would not allow myself even to start wrestling with negative thoughts about X.

10. _____I would prevent any intrusions into conscious awareness of undesirable thoughts or feelings associated with X.

11. _____I would think that X may have some negative aspects, but those aspects are a part of more positive ones.

12. _____I would reinterpret my feeling(s) about X as more positive.

13. _____I would think that X's negative characteristics might have understandable causes.

14. _____I would ask some questions to confirm what I suspect might be good about X.

15. _____I would remind myself that there are worse things than X.

16. _____I would view the positive aspects of X as more significant than the negative aspects.

17. _____I would continuously remind myself about all the good points about X, and not allow bad thoughts to intrude.

18. _____I would occupy my mind with other things so I will not think about the negative aspects of X.

19. _____I would fill my mind up with positive qualities about X so that I can block any negative qualities from entering.

20. _____I would try to avoid ever contemplating any negative thoughts about X.

21. _____When I thought of faults of X, I would try to connect them with good qualities.

22. _____I would reinterpret the disadvantages of X as advantages.

23. _____I would not blame X for things that are beyond X's control.

24. _____I would look for evidence that shows how good X is.

25. _____I would think about other alternatives that are much worse than X.

26. _____When I was annoyed by X, I would tell myself that there are other things about X that are more important.

27. _____I would focus so completely on the good things about X that I have no time to worry about any bad ones.

28. _____I would shift my thoughts elsewhere whenever I become aware that negative thoughts about X might be entering my mind.

29. _____I would immediately stop the intrusion of any negative thoughts I might have about X.

30. _____I would refuse to think about anything that might be wrong with X.

Appendix B

Please indicate your attitude toward exercise.
(-5 = very negative, 5 = very positive)

On average, over the course of a week, how many times do you:	Currently	Intend to in the future
Exercise	0 1 2 3 4 5 6 7 8 9+	0 1 2 3 4 5 6 7 8 9+

Think about <u>you</u> engaging in at least 2.5 hours of moderate exercise each week. Considering all the positive aspects (e.g., health, appearance, increased energy, etc.) and negative aspects (e.g., time it takes, lack of results, sweaty, etc.) of exercise, what would you say your "attitude" toward exercise is?   (Very Negative -5 to Very Positive +5)

Considering <u>only</u> the positives (e.g., health, appearance, increased energy, etc.) of <u>you</u> engaging in at least 2.5 hours of moderate to intense exercise a week, how positive are those aspects?
(0- Not at all positive; 5- moderately positive; 10- Extremely positive)

Considering <u>only</u> the negatives (e.g., time it takes, lack of results, sweaty, etc.) of you engaging in at least 2.5 hours of moderate to intense exercise a week, how negative are those aspects?
(0- Not at all negative; 5- moderately negative; 10- Extremely negative)

How many hours of exercise did you engage in over the <u>past four days</u> (previously today, yesterday, and the two days before that)?
Total number of hours: _____

How many hours of exercise do you think you'll engage in over the <u>next four days</u> (the rest of today, tomorrow, and the two days after that)?
Total number of hours: _____

Please rate how you feel about times when you are moderately physically active in general.

	1	2	3	4	5	6	7	
I hate it	○	○	○	○	○	○	○	I enjoy it
I am not at all absorbed in this activity	○	○	○	○	○	○	○	I am very absorbed in this activity
It's no fun at all	○	○	○	○	○	○	○	It's a lot of fun
I find it tiring	○	○	○	○	○	○	○	I find it energizing
It's very unpleasant	○	○	○	○	○	○	○	It's very pleasant
I feel bad physically while doing it	○	○	○	○	○	○	○	I feel good physically while doing it
It's not at all invigorating	○	○	○	○	○	○	○	It's very invigorating
I am very frustrated by it	○	○	○	○	○	○	○	I am not at all frustrated by it
It does not give me any sense of accomplishment at all	○	○	○	○	○	○	○	It gives me a strong sense of accomplishment
I felt as though I would rather be doing something else	○	○	○	○	○	○	○	I felt as though there was nothing else I would rather be doing

Appendix C

We are studying deliberate self-persuasion. We want to know how people can make themselves adopt more positive attitudes. Today, we want you to make yourself have a more positive attitude toward exercise. You can use whatever thought processes you believe will be most useful in adopting a more positive attitude toward exercise. Your task, then, is to sit quietly in your chair for the next five minutes and use your mental processes to make yourself have a more positive attitude toward exercise. You can close your eyes if you want, or keep them open. It's entirely up to you.

Appendix D
Self-Control Scale

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

Not at all　　　　　**Very much**

1——2——3——4——5

1. I am good at resisting temptation.
2. I have a hard time breaking bad habits.
3. I am lazy.
4. I say inappropriate things.
5. I never allow myself to lose control.
6. I do certain things that are bad for me, if they are fun.
7. People can count on me to keep on schedule.
8. Getting up in the morning is hard for me.
9. I have trouble saying no.
10. I change my mind fairly often.
11. I blurt out whatever is on my mind.
12. People would describe me as impulsive.
13. I refuse things that are bad for me.
14. I spend too much money.
15. I keep everything neat.
16. I am self-indulgent at times.
17. I wish I had more self-discipline.
18. I am reliable.
19. I get carried away by my feelings.
20. I do many things on the spur of the moment.
21. I don't keep secrets very well.
22. People would say that I have iron self- discipline.
23. I have worked or studied all night at the last minute.
24. I'm not easily discouraged.
25. I'd be better off if I stopped to think before acting.
26. I engage in healthy practices.
27. I eat healthy foods.
28. Pleasure and fun sometimes keep me from getting work done.
29. I have trouble concentrating.
30. I am able to work effectively toward long-term goals.
31. Sometimes I can't stop myself from doing something, even if I know it is wrong.
32. I often act without thinking through all the alternatives.
33. I lose my temper too easily.
34. I often interrupt people.
35. I sometimes drink or use drugs to excess.
36. I am always on time.

Lay Dispositionism

Using the scale provided, indicate the extent of your agreement with each item.

1	2	3	4	5	6
Very strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Very strongly agree

1. The kind of person someone is, is something very basic about them and it can't be changed very much.

2. People can do things different, but the important parts of who they are can't really be changed.

3. Everyone is a certain kind of person and there is not much that can be done to really change that.

Preference for Consistency

Using the scale provided, indicate the extent of your agreement with each item.

1	2	3	4	5	6	7	8	9
strongly disagree	disagree	somewhat disagree	slightly disagree	neither agree nor disagree	slightly agree	somewhat agree	agree	strongly agree

1. I prefer to be around people whose reactions I can anticipate.

2. It is important to me that my actions are consistent with my beliefs.

3. Even if my attitudes and actions seemed consistent with one another to me, it would bother me if they did not seem consistent in the eyes of others.

4. It is important to me that those who know me can predict what I will do.

5. I want to be described by others as a stable, predictable person.

6. Admirable people are consistent and predictable.

7. The appearance of consistency is an important part of the image I present to the world.

8. It bothers me when someone I depend upon is unpredictable.

9. I don't like to appear as if I am inconsistent.

10. I get uncomfortable when I find my behavior contradicts my beliefs.

11. An important requirement for any friend of mine is personal consistency.

12. I typically prefer to do things the same way.

13. I dislike people who are constantly changing their opinions.

14. I want my close friends to be predictable.

15. It is important to me that others view me as a stable person.

16. I make an effort to appear consistent to others.

17. I'm uncomfortable holding two beliefs that are inconsistent.

18. It doesn't bother me much if my actions are inconsistent.

Defensive Confidence

Respond to the following items using the scale: 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*)

1. During discussions of issues I care about, I can successfully defend my ideas.

2. I have many resources to defend my point of view when I feel my ideas are under attack.

3. When I pay attention to the arguments proposed by people who disagree with me, I feel confused and cannot think.

4. When trying to defend my point of view, I am not at all articulate.

5. I have developed ways of "winning" when I debate issues I care about.

6. I could stand by my ideas in front of anybody.

7. No matter what I read or hear, I am always capable of defending my feelings and opinions.

8. I think of myself as somebody who has enough information to defend his or her points of view.

9. Compared to most people, I am able to maintain my own opinions regardless of what conflicting information I receive.

10. Compared to people I know who are very successful at maintaining their point of view, I have somewhat weak, underdeveloped opinions.

11. I can defend my points of view when I want to.

12. I am unable to defend my own opinions successfully.

Please describe any suspicions you may have had about the true purpose of this study (i.e. you think the researchers were trying to hide something or deceive you in some way)?

_____

_____

_____

Please answer which of the below applies to you. Please note that your response <u>will not</u> affect your ability to receive credit for participation in this study.

__ Someone I know has participated in this study before me and told me about it.

__ I did not know anything about what this study would be like before coming in to participate.

Did you follow the instructions and answer questions carefully:

__ 100% of the time

__ 75% of the time

__ 50% of the time

__ 25% of the time

__ clicked buttons as fast as possible to complete the experiment

__ not actually reading this question right now either

__ other _____

Appendix F

Demographic Items

What is your academic year?

__ Freshman

__ Sophomore

__ Junior

__ Senior

What is your age?

_____

What is your religious affiliation?

__Christian

__Protestant

__Catholic

__Jewish

__Muslim

__Atheist

__Agnostic

__Buddhist

__Hindu

__Other

Racial/ethnic background:

__ White/Caucasian

__ Black/African American

__ Hispanic/Latino(a)

__ Asian/Asian American

__ Arab/Arab American

__ Native American/Alaskan Native

__ Pacific Islander

__ Other _____

Do you currently have a romantic partner?

__ Yes

__ No

__ Complicated/Unsure

Debriefing

This study was deliberate self-persuasion. Specifically, we are studying people's thought processes when they think about topics that are important on college campuses. We wanted to see if you could change your own attitude, and if that would have any effect on your immediate and delayed attitudes and behaviors and how resistant you would be to normative data (what other people supposedly think).

There is no reason at all for you to leave the experiment with attitudes different from what you had at the start of the experiment. In fact, previous research has shown conclusively that when participants in attitude change studies have the procedure and the reason for the procedure explain to them in detail, as we just did, their original attitudes remain intact.

If you have any further questions or concerns, a research assistant will be available immediately following this experiment. You can also contact Amanda Morin (a.wallace@tcu.edu) or Charles Lord, the faculty advisor for this project via e-mail at c.lord@tcu.edu.

Thank you very much for participating in this experiment.

Appendix H

Country Filler Task

Now, you will spend the next five minutes writing what you think about regarding various countries in the world.

For example, if the country was CUBA, you might list: cigars, Havana, missile crisis, etc.

Please spend 30 - 45 seconds listing thoughts about each country before moving on to the next. There should be more countries than you'll have time to finish in 5 minutes, that's okay.

Italy
Mexico
Canada
China
Germany

Brazil
England
Ireland
France
Japan

Egypt
Australia
Russia
Greece
India

Switzerland
Kenya
Spain
Jamaica
Argentina

Normative Data

We thought you'd be interested in the responses that other students at TCU have given for the same item that you just answered, "What is your attitude toward exercise." We are also interested in how well you will remember the pattern of responses presented in the table below so look them over carefully- there will be a recall test later in the study to see if you were able to remember the general pattern in the responses below.

[note: these responses are compiled from hundreds of TCU students, individual participants' responses will remain confidential]

What is your attitude toward <u>exercise</u>?

Number of responses: 1,363

EXAMINE THE RESPONSES BELOW. WHICH RESPONSE WAS SELECTED MOST OFTEN BY OTHER TCU STUDENTS?

-5 very negative   38 participants chose this response

-4   76 participants chose this response

-3   92 participants chose this response

-2

254 participants chose this response

-1

285 participants chose this response

0 neither positive or negative

373 participants chose this response

+1

114 participants chose this response

+2

85 participants chose this response

+3

29 participants chose this response

+4

14 participants chose this response

+5 very positive

3 participants chose this response

Appendix J

HLM Model Equations

Unconditional model. The unconditional model contains no independent variables and is similar to random-effects ANOVA. In this model, the within-subjects and between-subject variance in the dependent variable were calculated. The equations for Level 1 and Level 2, respectively, were:

$$y_{ij} = \beta_{0j} + e_{ij.} \tag{1}$$

$$\beta_{0j} = \gamma_{00} + u_{0j.} \tag{2}$$

Unconditional linear growth model. The unconditional linear growth model tested change in the individual (at Level 1) and change between individuals (at Level 2) over time (added uncentered). At Level 1, a linear equation was tested:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{time}_{ij}) + e_{ij.} \tag{3}$$

$$\beta_{0j} = \gamma_{00} + u_{0j.} \tag{4}$$

$$\beta_{1j} = \gamma_{10} + u_{1j.} \tag{5}$$

Conditional linear growth models. Conditional linear growth model testing addressed between-subject differences in change over time due to ET score and self-control score, and the corresponding interactions between each of these two variables and time. These variables were added successively to the model; however the equations shown below reflect the latter model in which both variables were present. The Level 1 equation did not change from the unconditional linear model, above, but the Level 2 model contained predictors that are fixed effects (i.e., E-T score and self-control). The Level 2 equations were:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{ET}_j) + \gamma_{02}(\text{SC}_j) + u_{0j.} \tag{6}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{ET}_j) + \gamma_{12}(\text{SC}_j) + u_{1j.} \tag{7}$$

Final conditional linear growth model. The final conditional linear growth model tested whether the intercepts and slopes varied due to differences between participants, as in the previous conditional growth models, but included the interaction between ET scale score and self-control, as well as the centered three way interaction with time. The Level 1 equation remained the same as in previous models and the equation of the final Level 2 model was:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{ET}_j) + \gamma_{02}(\text{SC}_j) + \gamma_{03}(\text{ETxSC}_j) + u_{0j.} \qquad (8)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{ET}_j) + \gamma_{12}(\text{SC}_j) + \gamma_{13}(\text{ETxSC}_j) + u_{1j.} \qquad (9)$$

VITA

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Education	Valedictorian, Riesel High School, Riesel, Texas, 2000
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ABSTRACT

EFFECTS OF EPISTEMIC AND TELEOLOGIC ATTITUDE CHANGE STRATEGIES ON
PERSISTENCE AND RESISTANCE OF SUBSEQUENT ATTITUDES

by Amanda Leigh Morin, PhD., 2014
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Previous theory and research shows that people can change unwanted attitudes cognitively,

either by epistemic strategies (altering the perceived valence of the attitude object's attributes) or

by teleologic strategies (altering the accessibility of the attitude object's attributes). Although

epistemic and teleologic strategies of self-persuasion have been shown to be equally effective for

immediate change, no empirical tests have shown one method to provide attitude change that is

either longer lasting or less susceptible to further change compared to the other. The present

research tested whether preference for epistemic versus teleologic strategies leads to new

attitudes that are more persistent (Experiment 1) or resistant (Experiment 2) to change. The

resistance hypothesis (in Experiment 2) was supported, but more for individuals low than high in

self-control. Reasons for these discrepancies are discussed.