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Assessment of Individual Differences in Regulatory Focus among Cigarette Smokers

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Abstract

Smoking cessation programs might benefit from tailoring messages to individual differences in regulatory focus (see Higgins, 1997), but there is little evidence on the stability or convergent validity of regulatory focus measures. In two studies, smokers completed four measures of regulatory focus: (a) Regulatory Focus Questionnaire (RFQ); (b) actual-ideal and actual-ought self-discrepancies; (c) response duration in naming name ideal or ought self-guides; and (d) reaction time for lexical decisions about one's ideal or ought self-guides. Study 1 included a one-month retest. Retest reliability was adequate, but convergent validity was poor. Questionnaire and self-discrepancy measures were unrelated to each other or to the reaction time measures. To facilitate future studies of tailored health behavior change interventions, research is needed to determine whether weak convergent validity resulted from (a) invalidity of some or all of the regulatory focus measures or (b) validity of each for measuring a different aspect of the construct.

Keywords

regulatory focus; prevention focus; promotion focus; retest reliability; convergent validity

Despite widespread dissemination of facts about the negative consequences of cigarette smoking, more than one-fifth of adults in the United States are current smokers (CDC, 2005), and approximately 40% of these smokers state that they have no intention of quitting smoking within the next six months (Prochaska, 2000). These “precontemplators” represent a challenge for motivational theories and techniques. A common denominator of motivational messages is the hedonic principle, that people seek to approach pleasure and avoid pain. According to Higgins' (1997) regulatory focus theory, though, it is important to distinguish different kinds of pleasure or desired states people attempt to approach. In particular, two types of self-regulatory focus are differentiated in this model.

In the promotion focus, the person is attempting to achieve her or his aspirations, to match ideals. If this is accomplished, happiness should ensue; if not, dejection and disappointment. The individual in a state of promotion focus is sensitized to whether gains are or are not being achieved. The core strategy of self-regulation in the promotion focus is approach. Conversely, in the prevention focus people are motivated to live up to responsibilities, to behave as they believe they ought to, and to attain safety. If this is accomplished, the person should feel calm; if not, anxious and agitated. The individual in a state of prevention focus is especially sensitive

to loss vs. non-loss information. The core strategy for self-regulation in the prevention focus is avoidance.

Many efforts to motivate cigarette smokers to quit have highlighted the utility of smoking cessation for avoiding future pain in the form of morbidity and mortality. By highlighting safety motives, these messages typify the prevention focus. Anti-smoking efforts may also use the promotion focus as a way to frame motives to quit smoking. In relation to smoking cessation, the promotion focus directs smokers' attention to desired gains they can achieve by becoming nonsmokers, for example pride, feelings of well-being, physical fitness, ability to purchase desired goods with the money now devoted to cigarettes. The prevention focus, conversely, directs attention to losses she or he might prevent by quitting smoking, such as being less likely to get lung cancer, being less apt to be banished from the office building to smoke outside, and wasting less money on cigarettes.

Taking regulatory focus into account may be useful in refining efforts to motivate smokers to quit. There may be stable individual differences in trait regulatory focus, and matching the framing of motivational messages to these individual differences could increase their impact. Evidence of such a matching effect emerged from an experiment on tailored messages promoting fruit and vegetable consumption as a cancer prevention strategy (Latimer, Katulak, Mowad, & Salovey, 2005, Study 6). Adults who contacted the National Cancer Institute's (NCI) Cancer Information Service and who reported at baseline not meeting the NCI's recommendation to consume at least five servings of fruits and vegetables per day were sent print materials advocating fruit and vegetable consumption, with emphasis on either accomplishment and achievement--tailored to the promotion focus--or safety and security--tailored to the prevention focus. Followup interviews at one month showed no significant effects for matching message emphasis with baseline measures of individual differences in regulatory focus. By the four-month followup, however, fruit and vegetable consumption was significantly higher among those promotion-focused participants who had received the promotion-focused messages. There was a nonsignificant trend toward such a matching effect for prevention-focused participants (Latimer et al., 2005, study 6).

Two complications arise in trying to follow up on these encouraging results and extend the use of regulatory focus theory to cigarette smoking cessation. First, there is no published evidence concerning the retest reliability of a measure of trait regulatory focus. For regulatory focus to be a useful individual-difference variable in tailoring clinical or public health interventions, it must show at least some temporal stability. Study 1 therefore included a one-month retest reliability evaluation of measures of regulatory focus.

Second, several quite distinct measures of trait regulatory focus have been utilized, yet there is little evidence concerning their convergent validity. Study 1 examined four of these measures. First, regulatory focus was assessed via attribute-entry response durations (Forster, Higgins, & Idson, 1998) for ideal self-guides and ought self-guides. Based on the assumption that response speed reflects construct accessibility, this method ascribes greater promotion focus to participants who quickly complete their responses to questions about the ideal self, attributes they aspire to have, and greater prevention focus to those who respond quickly to questions about the ought self, attributes they believe they have a duty or responsibility to possess.

An alternate method of assessing trait regulatory focus, lexical decision reaction times, eliminates the variability associated with speed of typing in the participant's ideal or ought self guides by requiring only yes/no responses as to whether a letter string is a word (Shah, Brazy, & Higgins, 2004, Study 2). Otherwise, the logic is the same as with attribute-entry response durations – participants who respond faster to correctly labeled ideal self-attributes are

interpreted as stronger in promotion focus, whereas those who respond quickly to ought self-attributes are considered higher in prevention focus.

Third, one can infer strength of promotion focus and prevention focus from the content of participant's self-discrepancy ratings (Keller & Bless, 2006). As part of the lexical decision task just described, participants make 1—7 ratings of the extent to which their actual characteristics fall short of their ideal guides or ought guides. Larger actual-ideal self-discrepancies are interpreted as reflecting greater trait promotion focus, and larger actual-ought discrepancies greater prevention focus.

Finally, a questionnaire measure of trait regulatory focus, the Regulatory Focus Questionnaire (RFQ; Higgins et al., 2001) derives from theorizing concerning developmental antecedents of promotion and prevention foci. Sample items include “How often have you accomplished things that got you ‘psyched’ to work even harder?” (Promotion) and “How often did you obey rules and regulations that were established by your parents?” (Prevention).

In summary, it appears that individual differences in trait regulatory focus exist and could be helpful in tailoring motivational messages concerning smoking cessation, but the retest reliability of these measures is uncertain, as is their convergent validity. Scores on the RFQ were not significantly related to self-discrepancies (Higgins et al., 2001, Study 2), though this result is somewhat inconclusive given a small sample size ($N = 28$). Convergent validity and retest reliability were evaluated for four measures of regulatory focus in Study 1, which also extended research on these measures by employing a racially diverse sample of adult smokers. Most studies incorporating measures of trait regulatory focus—all the studies using the reaction time tasks—have been conducted in college student samples. Whereas several of these studies have reported an absence of sex differences (e.g., Liberman, Idson, Camacho, & Higgins, 1999, Studies 2 and 4a), it is unknown whether results generalize across age.

Study 1: Retest Reliability and Convergent Validity

Method

Participants—Participants were 102 (53 men, 49 women) adult (age 18 or over) daily cigarette smokers who volunteered in response to newspaper advertisements for the research. About 5% ($n = 5$) were Hispanic or Latino. Most of the participants were either Caucasian ($n = 46$) or African American ($n = 46$), with the remainder being Native American ($n = 2$), Asian American ($n = 2$) or Multiracial ($n = 1$). Five participants declined to respond to inquiries about race and ethnicity. Participants ranged in age from 19 to 78 ($M = 46.0$, $SD = 12.1$) years.

Materials—For the purpose of sample description, participants completed a one-item continuous-variable measure of contemplation of quitting smoking, the Contemplation Ladder (CL; Biener & Abrams, 1991). Scores range from 0 (“no thought of quitting”) to 10 (“taking action to quit (e.g., cutting down, enrolling in a program)”). In a worksite sample of smokers, CL scores significantly predicted subsequent attendance at an educational program about smoking and associated risks (Biener & Abrams, 1991).

Nicotine dependence was measured with the Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991), a 6-item scale (e.g., “How soon after you wake do you smoke your first cigarette?”) with evidence of moderate internal consistency and positive correlations with length of smoking history, blood cotinine level, and a measure of “addiction” as a motive to smoke (Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994).

Trait regulatory focus was measured in four ways. The first was the Regulatory Focus Questionnaire (RFQ; Higgins et al., 2001). This 11-item self-report measure (6 Promotion items, 5 Prevention items) has shown good internal consistency of subscales, very low correlations between the subscales, and good fit with the hypothesized factor structure (Higgins et al., 2001). RFQ subscale scores predicted behavioral intentions in response to abstractly-worded vs. concretely-worded persuasive messages, the abstract being more persuasive for promotion-focused participants (Semin, Higgins, de Montes, Estourget, & Valencia, 2005). RFQ scores have also shown theoretically predicted relations with active coping (Grant & Higgins, 2003) and with decision-making task performances, tactics used in pursuit of goals, and subjective experiences (Higgins et al., 2001). For instance, those scoring higher in promotion focus on the RFQ were more likely to report feeling “eager” during a one-week study, whereas those scoring higher in prevention focus were more likely to report feeling “vigilant”, consistent with the security emphasis of the prevention focus.

The other three indicators were all derived from the same computerized task. Definitions for ideal self-guides and ought self-guides were first provided to the participant. The “ideal” self-guide is the type of person one would aspire to be, while the “ought” self-guide reflects the type of person one considers it one’s duty or responsibility to be. Participants were then asked to provide four ideal self-attributes and four ought self-attributes (ideal and ought alternating). Each of the eight responses had to be a single word, and each had to differ from the others.

Next, to generate filler stimuli for the lexical decision task, ideal and ought attributes were collected for four professions: reporter, architect, chef, and detective. After instructions on the lexical decision task, and ten practice trials, participants were asked to respond as quickly as possible to eight sets of 32 lexical decision (“is this a word?”) questions. Stimuli included the ideal and ought self-attributes they named earlier for themselves, as well as ideal and ought attributes they had listed for other targets (e.g., reporter). Each set of 32 trials consisted of a random sequence including 8 ideal-self and ought-self words, 8 words the participant had listed in reference to a control target, and 16 nonwords. Finally, participants made 1–7 ratings of self-discrepancies – how far they are from possessing the ideal and ought attributes they had named at the outset of the task in relation to themselves.

The attribute-entry indicator (Forster et al., 1998) was based on the average of (log-transformed) response durations for entering the four ideal self-attributes (faster responses = stronger promotion focus) and the four ought self-attributes (faster responses = stronger prevention focus). Attribute-entry response duration indicators of trait regulatory focus have proven useful in a number of studies, with each dimension, controlling statistically for the other, relating in theoretically expected ways to such variables as (a) measures of willingness to change to a new task after being interrupted (promotion focus being positively related to willingness to change, prevention focus negatively related) (Lieberman et al., 1999, Study 2); (b) approach and avoidance gradients when working to attain a goal (Forster et al., 1998, Study 1); (c) direction and magnitude of expectancy by value effects in pursuit of goals (Shah & Higgins, 1997); (d) frequency of experiencing dejection-related (promotion) vs. agitation-related (prevention) negative emotions when goals are not achieved (Higgins, Shah, & Friedman, 1997) or when misfitting tactics are described for attempting to achieve goals (Idson, Liberman, & Higgins, 2000); (e) speed of appraising how cheerful vs. dejected something makes you feel (more promotion-focused people faster) or how calm vs. agitated it makes you feel (more prevention-focused people faster; Shah & Higgins, 2001); and (f) global versus local processing in a letter-perception task (Forster & Higgins, 2005).

The self-discrepancy indicator was simply the average self-rating of actual-ideal (promotion focus) and actual-ought (prevention focus) discrepancies for the attributes listed. Using self-discrepancy measures to assess regulatory focus, Keller and Bless (2006; Experiment 1) found

interactive effects such that manipulations of regulatory focus matching the participant's trait focus were associated with the best performance on a math test.

The lexical decision reaction time indicator (Shah et al., 2004) was based on average log-transformed reaction times for correctly answered trials in the lexical decision task regarding one's own self-guides. Faster reaction times to correctly label as a word one's own ought self-attributes are interpreted as reflecting stronger prevention focus, and faster RT's to correctly label as a word one's own ideal self-attributes are interpreted as reflecting stronger promotion focus. Scores on this task have been significantly related to emotional and behavioral indicators of intergroup bias in theoretically predicted fashion (Shah et al., 2004), as well as to an EEG index of resting frontal cortical asymmetry (Amodio, Shah, Sigelman, Brazy, & Harmon-Jones, 2004). The program initially used for this measure contained an error such that only participants' responses to one (the last) set of 32 trials were recorded for the first 41 participants. For the remaining 61 participants [and for all participants in Study 2 below] data were averaged across all eight sets of trials. All subsequent Study 1 data using the lexical decision RT indicator are based on the subset for whom complete data were available.

Procedure—After giving informed consent, participants completed the questionnaires and the computerized task listed above in random order. One month later 100 (98%) of the 102 Time 1 participants returned to complete the regulatory focus measures a second time; the other 2 dropped out of the study. Participants were paid \$50 (\$10 at Time 1, \$40 at Time 2) as compensation for their time. Both studies reported in this article were approved by the Institutional Review Board of American University.

Results and Discussion

Sample description—Participants reported having smoked for an average of 26.7 years ($SD = 13.4$) and reported an average daily smoking rate of 16.4 cigarettes ($SD = 8.7$). The mean score on the FTND measure of nicotine dependence was 4.46 ($SD = 2.23$), and the mean on the CL measure of contemplating smoking cessation was 6.20 ($SD = 3.11$). Relative to the sample means reported by McDermut and Haaga (1998) in a similar study of non-treatment-seeking adult smokers (FTND = 2.77, CL = 5.4), the present sample was more nicotine dependent and more strongly considering quitting smoking.

Retest reliability of regulatory focus measures—Table 1 shows the one-month retest reliability of each regulatory focus indicator (left column), as well as partial correlations controlling statistically for the measure of the other dimension. For example, the partial correlation for the questionnaire measure of promotion focus is a correlation of Time 1 promotion focus with Time 2 promotion focus, controlling for Time 1 prevention focus. These analyses provide a more stringent test of the discriminability of promotion vs. prevention focus, as they control for theoretically irrelevant factors such as overall reflex speed that might contribute to stable fast reaction times on one of the measures. Results were the most favorable for the RFQ and for attribute entry response durations, with retest reliabilities for each dimension of at least .6, and partial correlations at least .4 and statistically significant. Results were similar for men as for women and similar for Caucasians and for African Americans. For example, the RFQ promotion subscale retest reliability correlation was identical (.71) for African Americans and Caucasians. Full details on the sex or race data are available from the corresponding author.

Convergent validity of regulatory focus measures and discrimination of promotion from prevention focus—Table 2 shows the intercorrelations among promotion focus and prevention focus indicators. Self-discrepancies were related only to each other (promotion and prevention $r = .64$), showing no significant convergence with reaction

time measures or the questionnaire measure (RFQ). The RFQ was essentially uncorrelated with self-discrepancies or the reaction time indicators of regulatory focus. The only significant convergent validity correlation was of the RFQ prevention subscale with prevention-focus lexical decision reaction time ($r = -.27$). An inverse correlation is the predicted direction inasmuch as shorter reaction times reflect greater prevention focus. However, exactly the same correlation was obtained for the RFQ prevention subscale with promotion-focus lexical decision reaction times.

All reaction time measures were significantly positively correlated with one another. None of the reaction time measures, however, was consistently better related to the others with which it shared a dimension. In other words, promotion focus indicators did not consistently relate better to other promotion indicators than to prevention indicators, nor the other way around.

The same-method association of promotion focus with prevention focus varied widely. Consistent with earlier work (e.g., Grant & Higgins, 2003), the RFQ subscales were largely independent ($r = .01$, NS), but on the other indicators promotion and prevention focus were positively correlated, as high as $r = .88$ for lexical decision reaction times. Accordingly, and consistent with earlier studies using these indicators, the convergent validity analyses were repeated while controlling statistically for the other subscale. Only one of these partial correlations was statistically significant in the predicted direction: attribute-entry response durations for ideal words correlated .29 ($p < .03$) with lexical decision reaction times for ideal words, controlling for lexical decision reaction times for ought words. However, the parallel analysis for “ought” [prevention focus] reaction times was not significant.

Association of regulatory focus with age—Age was not correlated significantly with questionnaire ($r = .14$ with promotion focus, $.00$ with prevention focus) or self-discrepancy ($r = .09$ with promotion focus, $.08$ with prevention focus) indicators of trait regulatory focus. Age was, however, significantly positively correlated with attribute-entry promotion focus ($r = .29$, $p < .01$) and prevention focus ($r = .33$, $p < .01$). Age was also positively correlated with lexical decision reaction times for promotion focus ($r = .36$, $p < .01$) and marginally so with prevention focus ($r = .25$, $p = .06$).

In summary, there was some favorable evidence of the temporal stability of regulatory focus measures across a one-month retest interval, particularly for the RFQ subscales and attribute entry response durations. However, there was little support for the premise that the questionnaire, self-discrepancy ratings, and reaction time measures converge in measuring the same construct. The reaction time measures showed positive zero-order correlations with age, underscoring the need for statistical control of general reaction times before giving substantive interpretations of reaction time measures for a particular type of word.

Study 2: Construct Validity

Study 2 was used to broaden the net as a way of trying to improve understanding of what the regulatory focus indicators are measuring. In particular, regulatory focus was correlated with several other individual differences: optimism, neuroticism, and depressive symptoms. Optimism is important to consider because it has been related cross-sectionally and prospectively to physical health (e.g., Scheier & Carver, 1985) and to completion of addiction treatment programs (Strack, Carver, & Blaney, 1987). It may be related to dispositional regulatory focus in that the reaction time measures of regulatory focus entail specifying among other things the characteristics of the type of person one aspires to be. This is an issue to which highly optimistic people may have given more consideration and therefore be prepared to answer more quickly than their less optimistic counterparts. Empirically, a study using the

RFQ found that optimism positively correlated with promotion but not prevention focus (Grant & Higgins, 2003).

Neuroticism is a major dimension of normal personality, and some research has suggested that it may confound the measurement of optimism (Smith, Pope, Rhodewalt, & Poulton, 1989). Depressive symptoms were included for several reasons. First, depression is associated with cigarette smoking, especially highly dependent smoking (e.g., Breslau, Kilbey, & Andreski, 1991), and with difficulty in quitting smoking (e.g., Niaura et al., 2001). Second, depression can be reflected in psychomotor retardation, and slowed response times could affect scores on the regulatory focus measure. Third, depression can alter perceptions of oneself and others relative to perceptions of the same people and behaviors in normal mood. For example, cross-sectional studies in clinical and nonclinical adult samples show that current depression is associated with perceiving one's parents as having been emotionally rejecting during one's childhood, but this effect is not evident once depression has remitted, though remission logically cannot alter the reality on which one is reporting (parental treatment during childhood) (Rapee, 1997). Such mood-driven perceptions could affect evaluation of self-guides and therefore regulatory focus scores. The RFQ subscales were both negatively correlated with depressive symptoms (Grant & Higgins, 2003), but there is no previous research relating the reaction time measures to depression.

In addition to evaluating discriminant validity of regulatory focus measures, a secondary purpose of Study 2 was to replicate study 1 results pertaining to convergent validity and associations with age. Especially for the lexical decision reaction time indicator, Study 1 had a limited sample size, making replication especially important.

Method

Participants—Participants were 72 (39 men, 33 women) daily cigarette smokers who had not participated in Study 1 and who volunteered in response to newspaper advertisements. Almost two-thirds (64%) were African American, the rest being Caucasian (32%), Asian American (3%), or Multiracial (1%). The average age was 45.2 ($SD = 10.3$) years. Participants reported smoking a median of 15 cigarettes/day and the median FTND score was 5.

Materials—The same measures were included as in Study 1. Additionally, participants completed three other self-report measures. The revised Life Orientation Test (LOT; Scheier, Carver, & Bridges, 1994) was used to assess optimism, a generalized expectancy for positive outcomes. The LOT is a 10-item self-report questionnaire that demonstrates adequate internal consistency and satisfactory retest reliability (Scheier, et al., 1994). Highly optimistic people as defined by scores on this test are more apt to use problem-focused coping for controllable stressors, adjust better to novel situations, recover more quickly from surgery, and experience fewer depressive symptoms (for a review, see Carver & Scheier, 1999). Neuroticism was measured with the neuroticism subscale from the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The NEO-FFI consists of 12 items that measure a predisposition to negative affect (McCrae, 1990). Items are rated on a 5-point scale from “strongly disagree” to “strongly agree”. Depressive symptom severity was measured with the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), a 21-item scale with content reflecting diagnostic criteria for major depressive disorder.

Procedure—After giving informed consent, participants completed the questionnaires listed above, as well as a couple of others not relevant to this report (Friedman-Wheeler, Ahrens, et al., in press; Friedman-Wheeler, Haaga, et al., in press), and the computerized task in random order in individual assessment sessions. They were paid \$25 to compensate for their time.

Results and Discussion

Convergent validity and discrimination of promotion from prevention focus—

Table 3 shows the intercorrelations of regulatory focus indicators. As in Study 1, the questionnaire (RFQ) subscales were not significantly correlated with each other ($r = .22$, NS) but also not significantly correlated with any of the other regulatory focus indicators. Likewise, self-discrepancy ratings were not correlated with the questionnaire or any reaction time indicators, though prevention and promotion focus self-discrepancies were strongly intercorrelated ($r = .66$).

Reaction time indicators were all positively and significantly correlated. The lexical decision reaction times for promotion-focus and for prevention-focus were very closely related ($r = .93$), as were those for attribute entry response durations ($r = .77$). The cross-method correlations (e.g., attribute entry response durations with lexical decision RT's) were all about the same and in the .3 range, thus showing no clear pattern of convergence of promotion focus indicators separate from prevention focus indicators.

Relations with other individual difference measures—Age was not significantly correlated with promotion focus, controlling statistically for prevention focus, nor with prevention focus controlling for promotion focus, on any of the indicators (see Table 4). Zero-order correlations of regulatory focus measures with age were generally similar to those obtained in Study 1. Age was not significantly correlated with the questionnaire measure of promotion ($r = .04$) or prevention ($r = .01$) focus. Unlike in Study 1, there was a positive correlation of age with self-discrepancy, though it was significant only for prevention focus ($r = .28$, $p < .02$), not promotion focus ($r = .18$). As in Study 1, age correlated positively with reaction times, both for lexical decisions ($r = .43$ for promotion focus, $.41$ for prevention focus, p 's $< .001$) and for attribute entry ($r = .38$ for promotion focus, $.36$ for prevention focus, p 's $< .01$).

Attribute entry response durations, self-discrepancies, and the prevention subscale of the RFQ were all uncorrelated with optimism, depression, and neuroticism. The RFQ promotion subscale, controlling for prevention, was strongly positively correlated with optimism and negatively correlated with depression and neuroticism, in each case consistent with the findings of Grant and Higgins (2003). A novel finding was that neuroticism was also associated with greater prevention focus (faster reaction times) and lesser promotion focus on the lexical decision task.

General Discussion

Several aspects of the reliability and validity of four measures of trait regulatory focus were evaluated in two adult samples of daily cigarette smokers. Briefly, the Regulatory Focus Questionnaire (RFQ; Higgins et al., 2001) showed adequate one-month retest reliability (Study 1) and nonsignificant correlations between the promotion focus and prevention focus subscales (both studies). RFQ scores were not correlated with age. Replicating earlier work, RFQ promotion subscale scores were positively correlated with optimism and negatively correlated with depression and neuroticism. The main concern about the RFQ arising from the results is that scores on this questionnaire were not significantly related to the other indicators of regulatory focus. Pending additional work on the construct validity of these measures, it would be premature to say whether this reflects invalidity of the RFQ, invalidity of the other regulatory focus measures, or perhaps validity of each for measuring different aspects of regulatory focus (cf. Bornstein, 1998; Terrill, Friedman, Gottschalk, & Haaga, 2002).

Use in future research of self-discrepancy scores, as in the study by Keller and Bless (2006), to measure regulatory focus seems unwarranted. Empirically, the ideal and ought self-

discrepancies were highly correlated with each other (correlations in the 60s) but not with other measures of regulatory focus (questionnaire or reaction times). Conceptually, it seems questionable to interpret low self-discrepancy as a low level of regulatory focus. One could, for instance, be very concerned with trying to match ideals, using approach tactics, monitoring whether gains are being achieved, and so on, yet not show high actual-ideal self-discrepancies because one's regulatory efforts seem to be going well. Consistent with this argument, in one experiment using attribute-entry response durations as a regulatory focus measure, self-discrepancies were included "to control for any possible effects they might have on performance", not as an alternate indicator themselves of regulatory focus (Shah et al., 1998, p. 288).

Findings with the reaction time measures of regulatory focus were mixed. Each dimension (promotion focus, prevention focus) considered alone is positively correlated with age and very highly correlated with the other dimension, up to $r = .93$ for lexical decision reaction times in Study 2. It seems clear, then, that studies using these measures need to statistically control for the alternate dimension in order to have a measure interpretable as saying something about, say, prevention focus in particular as opposed to the person's overall response speed, computer familiarity, cooperation with the task, and so on. With that in mind, a few encouraging results were obtained with this measure – significant retest reliability for promotion focus in Study 1, and correlations of both dimensions with neuroticism in Study 2. However, convergent validity relations with other measures, even attribute-entry response durations as have been employed in numerous studies of regulatory focus, were unimpressive.

One limitation of these studies is the failure to collect systematic data on the level of education of the participants. These are the first non-university-student samples to complete reaction time measures of regulatory focus. The weak results with regard to convergent validity therefore give some pause regarding the transportability of these measures. Anecdotally, some confusion among participants occurred regarding the meaning of "attributes", and there was considerable boredom and frustration with the length of the computer task. Future research should systematically investigate the association of level of education with reliability and validity data on these measures. It may also be valuable to consider using shorter versions of the lexical decision task in order to sustain participant interest and engagement.

In conclusion, regulatory focus theory has important conceptual and practical implications for clinical and health psychology intervention developers. It has been hypothesized that individual differences in trait prevention and promotion focus in particular could facilitate the use of tailored motivational messages for health behavior changes (Latimer et al., 2005). A concern arising from the research reported in this article, however, is that the various measures of trait regulatory focus now in use are not well-correlated with one another. More research on the characteristics of these measures is therefore needed to ensure that future intervention studies will be optimally targeted and cumulative in the information value provided.

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Table 1
Retest Reliability of Regulatory Focus Measures (Study 1)

Indicator	T1/T2 retest correlation	Partial Correlation
RT for attribute entry		
Promotion	.68 [*]	.43 [*]
Prevention	.70 [*]	.48 [*]
RT for lexical decisions (<i>n</i> = 61)		
Promotion	.63 [*]	.32 [*]
Prevention	.60 [*]	.07
Self-discrepancy ratings		
Promotion	.65 [*]	.48 [*]
Prevention	.45 [*]	.21 [*]
Questionnaire		
Promotion	.70 [*]	.70 [*]
Prevention	.63 [*]	.63 [*]

* $p < .05$.

N = 100 unless otherwise indicated.

Table 2
Intercorrelations of Regulatory Focus Measures in Study 1 at Time 1

1. Attribute Entry RT [promotion]						
2. Attribute Entry RT [prevention]						
3. Lexical Decision RT [promotion]						
4. Lexical Decision RT [prevention]						
5. Self-discrepancies [promotion]						
6. Self-discrepancies [prevention]						
7. RFQ [promotion]						
8. RFQ [prevention]						
1	.67*					
2	.34*	.88*				
3	.47*	.29	.22*			
4	.39	.14	.11	.64*		
5	.14	.09	.00	.01	.01	
6	.03	.01	.07	-.08	-.08	
7	.08	-.13	-.27*	-.08	-.17	.01
8	.02	.07	-.27*	-.08	-.17	.01

Note N = 100 except for indicators 3 and 4 [n = 60].

* p < .05

Table 3
Intercorrelations of Regulatory Focus Measures in Study 2

	1	2	3	4	5	6	7
1. Attribute Entry RT [promotion]							
2. Attribute Entry RT [prevention]	.77*						
3. Lexical Decision RT [promotion]	.34*	.33*					
4. Lexical Decision RT [prevention]	.28*	.32*	.93*				
5. Self-discrepancies [promotion]	.09	.04	-.04	-.06			
6. Self-discrepancies [prevention]	-.05	-.07	-.04	-.03	.66*		
7. RFQ [promotion]	-.10	-.15	-.03	.01	.03	.08	
8. RFQ [prevention]	.03	.01	-.01	.08	.01	.14	.22

Note *N* = 72.

* *p* < .05.

Table 4

Individual Difference Correlates of Regulatory Focus Measures in Study 2

	Age	Optimism	Depression	Neuroticism
Attribute Entry RT [promotion]	.17	.03	-.01	.02
Attribute Entry RT [prevention]	.12	-.07	-.03	.00
Lexical Decision RT [promotion]	.15	-.05	.11	.27*
Lexical Decision RT [prevention]	.03	.12	-.09	-.27*
Self-discrepancies [promotion]	-.01	.01	-.04	.03
Self-discrepancies [prevention]	.22	.04	.08	.01
RFQ [promotion]	.04	.53*	-.39*	-.48*
RFQ [prevention]	.01	.13	.11	-.13

Note. $N = 72$.

*
 $p < .05$.

All correlations are partial correlations, controlling for the other regulatory focus subscale [e.g., correlations of lexical decision RT for promotion focus with other measures partial out lexical decision RT for prevention focus].