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Big Five traits, affect balance and health behaviors: A self-regulation resource perspective

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Highlights

- Conscientiousness, Agreeableness and Neuroticism are linked to health behaviors
- The reasons for these links are not fully understood
- Affect balance was examined as a self-regulation resource for these traits
- Results support a self-regulation resource model linking traits to health behaviors

Abstract

Despite the relatively consistent finding that Conscientiousness, Agreeableness and low Neuroticism are associated with the practice of health-promoting behaviors, the reasons for these linkages are not well understood. This prospective study addressed this gap by taking a self-regulation resource perspective on why these traits relate to health-promoting behaviors by examining the role of higher positive relative to negative state affect. Students completed baseline (N = 330), and two week follow-up (N = 195) surveys. Bootstrapping analyses of the indirect effects of each of the three traits on Time 2 health behaviors were significant in the expected directions, with Kappa squares ranging from .11 to .13. In the full longitudinal analyses controlling for Time 1 health behaviors, the indirect effects of Conscientiousness and Agreeableness through affect balance on Time 2 health behaviors were positive and significant, whereas the indirect effects through Neuroticism were negative and significant after accounting for the Time 1 practice of health behaviors. These findings provide a process-oriented understanding of how Big Five traits are linked to health-promoting behaviors and extend previous research supporting a self-regulation resource perspective on personality and health behaviors.

KEYWORDS: Five factor traits; affect balance; self-regulation; health behaviors

Introduction

Despite the known benefits of engaging in health-promoting behaviors for current and long-term health and well-being, many individuals have difficulty regulating these important behaviors while others are more successful at reaching and maintaining their health behavior goals, perhaps due to intra-individual factors such as personality and mood. Indeed, current theory and research highlight personality as a key factor for understanding health behaviors and related outcomes (e.g., Smith, 2006). The Big Five trait taxonomy (Costa & McCrae, 1985; John & Srivastava, 1999) is one commonly used model for understanding how personality relates to health behaviors, with considerable evidence supporting the role of three particular personality factors. Both Conscientiousness and Agreeableness have been linked to the practice of health promoting behaviors (Booth-Kewley & Vickers, 1994; Hampson, Goldberg, Vogt, & Dubanoski, 2007; Ingledew & Brunning, 1999; Lemos-Giraldez & Fidalgo-Aliste, 1997), whereas Neuroticism is associated with fewer health promoting behaviors (Booth-Kewley & Vickers, 1994; Ingledew & Brunning, 1999).

However, the reasons proposed for these relations have focused more on the qualities associated with these traits than on the underlying self-regulation processes that may be involved. Engaging in health behaviors can be viewed as the prototypical self-regulatory task (Baumeister, Heatherton, & Tice, 1994), in part, because it requires monitoring and regulating emotional states to maintain focus on the long term consequences of behavior rather than giving in to the immediate rewards of unhealthy choices (Sirois & Pychyl, 2013; Tice & Bratslavsky, 2000). Viewing the relation between personality factors and health behaviors from such a self-regulation lens may contribute to a better understanding of why certain traits may promote or prevent the practice of health-promoting behaviors.

The Self-Regulation Resource Model (SRRM) (Sirois, 2015a, 2015b) is a previously tested conceptual framework for understanding the links between personality and health behaviors, which may be useful for understanding why the personality traits of Conscientiousness, Agreeableness, and Neuroticism are differentially related to the practice of health-promoting behaviors. Building on cybernetic (Carver & Scheier, 1998) and strength models of self-regulation (Baumeister, Vohs, & Tice, 2007), the SRRM focuses on the central role of resources such as affective states, future orientation, and perceptions of control in facilitating successful self-regulation of health behaviors, and the increased likelihood of misregulation of these behaviors when resources are absent or depleted. In line with In the SRRM, resources refer to factors which serve as aids or tools that can be used in times of need to bolster self-regulation but which, nonetheless, are limited (Sirois, 2015a). Certain personality traits may therefore promote the practice of health behaviors to the extent that they are also associated with self-regulation resources.

Affect, and specifically the relative balance between positive and negative affect, is considered a core component of the SRRM (Sirois, 2015a). Positive affect is posited to serve as a self-regulatory resource by promoting a broad, future-oriented mindset critical to the practice of health behaviors (Sirois, 2014), and through its attenuating effects on stress and negative affect (Fredrickson, 2001), two states that can interfere with the regulation of health behaviors (Wagner & Heatherton, 2015). Experimental studies have also demonstrated the restorative effects of positive affect when self-regulation capacity is depleted (Tice, Baumeister, Shmueli, & Muraven, 2007) and, importantly, positive affect is associated with health-promoting behaviors cross-sectionally and longitudinally (Conner, 2013; Pressman & Cohen, 2005; Sirois, Kitner, & Hirsch, in press; Steptoe, 2010).

The assertion that negative affect plays a central role in self-regulation failure is widely accepted (e.g., Wagner & Heatherton, 2015). The SRRM posits that negative affect can threaten self-regulation in either of two ways: 1) by redirecting limited self-regulatory resources to prioritize short-term mood repair over long-term behavior, thus consuming the self-regulatory resources that would otherwise be directed toward goal-directed activity (Sirois & Pychyl, 2013; Tice, Bratslavsky, & Baumeister, 2001); and, 2) by narrowing the temporal scope and foreshortening the temporal horizon of one's behavior because of the activation of brain areas associated with threat detection (Sirois, 2014), which makes it easier to choose short-term rewards associated with unhealthy behaviors (Sirois, 2015a; Wagner & Heatherton, 2015).

Evidence supporting the value of the SRRM for explaining why certain traits relate to the practice of health-promoting behaviors is promising, but limited. In one cross-sectional study of a large sample of emerging adults, the association of self-compassion to intentions to engage in health-promoting behaviours, via positive and negative affect and controlling for current health behaviors, yielded a significant indirect effect for negative but not positive affect (Sirois, 2015b). However, in a meta-analysis of the indirect effects of positive and negative affect linking self-compassion to the frequency of health behaviors across eight studies (N = 1,635), both positive and negative affect were significant mediators (Sirois et al., in press). The SRRM has also been applied to explain the differential relations of perfectionistic strivings and perfectionistic concerns with health behaviors, with the latter being linked to fewer health-promoting behaviors, and the former being unrelated to health-promoting behaviors (Sirois, 2015a). In one study, perfectionistic striving was positively associated with both positive and negative affect, essentially neutralizing the proposed effects of each on the self-regulation of health behaviors (Sirois, 2015a). Within this same study, in a more direct test supportive of the SRRM, both low

positive and high negative affect explained the link between perfectionistic concerns and less frequent health-promoting behaviors, over and above the effects of future orientation.

There are several reasons to expect that the SRRM will also be useful for understanding how higher-order personality traits relate to health behaviors. Conscientiousness, Agreeableness and Neuroticism have each demonstrated links to positive and negative affect that may, in turn, explain their differential relations to health-promoting behaviors. For example, both Conscientiousness and Agreeableness are associated with higher levels of trait positive affect in the form of optimism (Sharpe, Martin, & Roth, 2011), and to state positive affect (McCrae & Costa, 1991). In contrast, Neuroticism is associated with lower levels of emotional health (McCann, 2011), and higher levels of negative affectivity are a well-documented core feature of this trait (McCrae & John, 1992). Although the relations of Neuroticism to positive affect are more complex (e.g., Liu, Wang, & Li, 2012), Neuroticism is generally linked to lower levels of positive affect (Steel, Schmidt, & Shultz, 2008). There is also evidence that Conscientiousness and Agreeableness relate positively, and Neuroticism relates negatively, to self-compassion (Neff, Rude, & Kirkpatrick, 2007), a quality that is associated with the practice of positive health behaviors through high positive and low negative affect (Sirois et al., in press). Finally, cybernetic trait theory (DeYoung, in press) suggests that Big Five traits can be subsumed under two broader *meta-traits* reflecting the distinct goal-related mechanisms involved in the five stages of the cybernetic cycle: (1) goal activation, (2) action selection, (3) action, (4) outcome interpretation, (5) goal comparison. From this perspective, Conscientiousness, Agreeableness, and Neuroticism (negative pole) form the meta-trait *Stability* which reflects particular self-regulatory aspects of the higher order personality traits essential for shielding goals, and enacting strategies to protect goals from disruption by impulses. It follows that these three traits rather

than the remaining two factors, Extraversion and Openness, should be most relevant for understanding the links of personality to health-promoting behaviors from a self-regulation perspective.

The Present Research

Despite the relatively consistent findings that Conscientiousness and Agreeableness are associated with the more frequent practice of health-promoting behaviors (e.g., Hampson et al., 2007), and Neuroticism is associated with fewer health-promoting behaviors (e.g., Booth-Kewley & Vickers, 1994), the reasons for these linkages are not well understood. In the current study, we address this gap by applying a self-regulatory perspective to the relation between these personality traits and health-promoting behaviors, using the SRRM (Sirois, 2015a, 2015b) as our conceptual lens. Accordingly, we expected that Conscientiousness and Agreeableness would each be associated with more frequent practice of health-promoting behaviors, and that high levels of state positive affect, and low levels of state negative affect would explain these linkages. We also expected that the high levels of state negative affect and low levels of state positive affect associated with Neuroticism would be predictive of less frequent health-promoting behaviors.

Previous research testing the SRRM has been limited by cross-sectional study designs, and has tested the unique rather than the relative contributions of positive and negative affect for explaining how personality relates to health behaviors (Sirois, 2015a, 2015b; Sirois et al., in press). To address these methodological and conceptual gaps, we examined the longitudinal associations of Conscientiousness, Agreeableness, and Neuroticism to the frequency of self-reported health-promoting behaviors over a two week period. Rather than testing the potential mediating roles of positive and negative affect separately using multiple mediation analyses, we

used an index of affect balance to examine how the relative level of positive to negative affect might account for the links between each of the three traits and health behaviors over time. This approach is consistent with the tenets of the SRRM which posit that higher levels of positive affect relative to negative affect will result in optimal replenishment of the self-regulation resources necessary for successful engagement in health-promoting behaviors (Sirois, 2015a). The simple time-lagged indirect effects of Time 1 personality factors and affect balance on Time 2 health-promoting behaviors were first tested to examine the unadjusted relations among the SRRM model variables. The mediation models were then retested controlling for Time 1 health behaviors to provide a more stringent test of the SRRM.

Methods

Participants and Procedure

Following clearance from the university research ethics board, undergraduate students were recruited through announcements posted to the University first year student participant pool. Students were invited to enroll in longitudinal study. A sample of 330 students (68.3 percent female, mean age of 21.74, *SD* = 6.17) completed the Time 1 survey, and 195 students (74.7 percent female, mean age = 21.55, SD = 5.60) completed the Time 2 survey two weeks later. All students received extra course credit points for their participation at each time point. Upon arriving at the lab participants read and signed a consent form and then completed a survey which was decoupled from the consent form and course credit information. A unique identifier code was used to link the Time 1 (T1) to the Time 2 (T2) surveys.

Materials

In addition to basic demographics questions, the following measures were completed at T1. The measure of health behaviors was also completed at T2.

Big Five personality factors. The 44-item Big Five Factor Inventory (BFFI; John & Srivastava, 1999) assessed three of the five Big Five personality factors of interest for this study: conscientiousness, agreeableness, and neuroticism. Characteristics reflecting each factor are presented after the statement "I see myself as someone who …" Characteristics are rated on a 5-point Likert scale ranging from 1 (Disagree strongly) to 5 (Agree strongly) with higher scores reflecting greater identification with the personality factor. The BFFI has demonstrated good internal consistency, with alpha coefficients ranging from .81 for Conscientiousness to .88 for Extraversion, and has demonstrated good construct validity in comparison with other Big Five measures (John & Srivastava, 1999). In the current study the internal consistencies were adequate for Conscientiousness, Agreeableness, and Neuroticism (Cronbach's alphas = .78, .72, .83 respectively).

Affect balance. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used to assess the balance between state positive and negative affective states at T1. The PANAS consists of 20 items consisting of words describing different feelings (e.g., happy, upset), with 10 items for each of the positive and negative affect scales. For this state version of the PANAS respondents rated their current experience of each of the feelings listed on a 5-point Likert scale ranging from 1 for *very slightly or not at all* to 5 for *extremely.* Psychometric properties for the PANAS subscales include good discriminate and internal reliability (alpha = .88)(Crawford & Henry, 2004); in the current study, reliabilities for the positive affect (alpha = .89), and negative affect (alpha = .86) subscales were very good. Affective balance was calculated by using a variation of the method by Koydemir et al. (2013); the mean score for negative affect was subtracted from the mean for positive affect, and 5 was added to the total to eliminate negative values. Higher scores indicate a more positive affect

balance.

Health behaviors. The practice of health promoting behaviors was assessed with the Wellness Behaviors Inventory (WBI; Sirois, 2001), a previously validated 10-item measure of the weekly performance of common health-related behaviors (e.g., Sirois, 2007). Items such as "I exercise for 20 continuous minutes or more, to the point of perspiration" and "I eat healthy, well-balanced meals" are rated on a 5-point scale with possible responses ranging from 1 (*less than once a week or never*) to 5 (*every day of the week*). After reverse keying 2 items (eating junk foods and drinking three or more caffeinated beverages), a mean of all items is calculated, with higher scores indicating more frequent performance of health behaviors in a given time frame. For T1 the time frame was 3 months; for T2 the time frame was set to 2 weeks to capture the frequency of health behaviors between T1 and T2. The WBI has demonstrated sensitivity in assessing changes in self-reported health behaviors over 2 week and 6 month intervals in student and adult samples (Sirois & Hirsch, in preparation). Other psychometric properties of the WBI include good convergent validity with other health behaviors such as medical and dental check-ups, and performing household safety behaviors (Sirois, 2007), and adequate internal consistency across student and community samples (Sirois et al., in press). The internal consistency in the current study was also adequate for T1 (alpha = .73) and T2 (alpha = .72).

Results

Table 1 presents the descriptive statistics for the model variables. As expected, Conscientiousness and Agreeableness were each positively and significantly correlated with positive affect, affect balance and health behaviours at T2, and negatively correlated with negative affect. The results for Neuroticism were also significant but in the opposite direction, as expected. Positive but not negative affect, and affect balance were significantly associated with

health behaviors at T1 and T2. A paired samples *t-test* revealed that there was a significant decrease in the self-reported practice of health behaviors from T1 to T2, t (194) = 2.74, $p < .01$.

The significance of the indirect effects (mediation) of each of the three personality factors on T2 health behaviors through affect balance were evaluated using the SPSS macro PROCESS (Hayes, 2013) which employs a bootstrapping resampling procedure that draws *k* bootstrapped samples from the data to estimate the indirect effect and its confidence interval (CI). The current analyses used 5,000 bootstrapping resamples and bias corrected 95 percent confidence intervals. The effect sizes for the simple time-lagged mediation models for each of the three personality factors were estimated with the Kappa^2 statistic.

The indirect effect through affect balance was significant for Conscientiousness (Kappa^2 = .11, 95% CI = .06, .17), Agreeableness (Kappa^2 = .11, 95% CI = .06, .17), and Neuroticism (Kappa^2 = .13, 95% CI = .07, .21). However, the direct effect remained significant for Conscientiousness (b = .23, 95% CI = .09, .37) indicating that affect balance only partially mediated the link between Conscientiousness and health behaviors.

Full longitudinal mediation models were tested by including T1 health behaviours as a covariate (see Table 2). The total variance in T2 health behaviors explained by each of the three models was 74 percent. Supporting the predictions of the SRRM, the indirect effects of Conscientiousness and Agreeableness through affect balance on T2 health behaviors were positive and significant, whereas the indirect effect through Neuroticism was negative and significant after accounting for the T1 practice of health behaviors. In each of the three models, the direct effect of personality on health behaviors was no longer significant after accounting for the indirect effects through affect balance, supporting full mediation.

Discussion

Consistent with a self-regulation resource perspective on personality and health behaviors, we found that affect balance prospectively explained the associations of Conscientiousness, Agreeableness, and Neuroticism with the frequency of engaging in health-promoting behaviors. Importantly, the value of affect balance for explaining health behaviors was demonstrated by the significant indirect effects that remained after accounting for T1 health behaviors which explained a substantial proportion of the variance in T2 health behaviors.

Our study extends current knowledge on both the SRRM and our understanding of how Big Five traits are linked to health-promoting behaviors in several important ways. In addition to being the first study to provide a prospective test of the SRRM, it is also the first test of the SRRM with higher order traits, and those reflecting the meta-trait *Stability* in particular. The self-regulation resource perspective of the SRRM complements the cybernetic approach to personality which highlights the importance of Conscientiousness, Agreeableness, and low Neuroticism for maintaining the motivational, social, and emotional stability, respectively, of ongoing goal-directed functioning (DeYoung, in press). To the extent that motivational stability inherent to Conscientiousness, and the social stability inherent to Agreeableness, give rise to higher levels of positive affect relative to negative affect, then the SRRM suggests that each of these traits are linked to the emotional resources necessary for successful self-regulation of health-promoting behaviors. This view provides a more process-oriented account of the relations of these traits to health behaviors than previous speculations that the self-discipline and organization associated with Conscientiousness, and the cooperative spirit associated with Agreeableness, reflected a general respect for social convention that was conducive to engaging in health-promoting behaviours (Booth-Kewley & Vickers, 1994). From a self-regulation perspective, the links to health-promoting behavior may be better explained by the behavior-

stabilizing functions of the positive affective states associated with these traits. If we consider that *Stability* reflects the capacity of cybernetic systems to resist immediate distractions and instead stay focused on long-term goals (DeYoung, in press), then positive affective states may be a key factor for both shielding one's goals from current distractions (e.g., Kuhl, 1984), and keeping a broad, future-oriented focus that is necessary for successful goal completion (Sirois, 2014).

Another contribution of the current study was our examination of the indirect effects of personality on health behaviors through affect balance rather than through positive and negative affect separately, as in previous tests of the SRRM. This approach may be a more precise test of the SRRM, which posits that it is higher levels of positive affect relative to low negative affect that maximizes the self-regulation resources necessary for health behaviors (Sirois, 2015a). As well, it should be noted that affect balance can be viewed as an index of subjective well-being (Koydemir et al., 2013); indeed, much of the variance in subjective well-being can be explained by affectivity (Davern, Cummins, & Stokes, 2007).

Our findings also suggest that affectivity is influenced by personality and, in turn, exerts small but significant effects on health behaviors. There is a limited precedent for this model. Research supports the linkage between personality traits and affect balance. For instance, in a sample of nursing professionals, affect balance was positively related to conscientiousness and negatively related to neuroticism (González et al., 2014). Yet very few studies have explored the link between affect balance and health (e.g., Howell, Kern, & Lyubomirsky, 2007), and none have done so in the context of personality.

Whereas previous research with the SRRM has examined mid-level traits and qualities such as self-compassion (Sirois, 2015b; Sirois et al., in press) and maladaptive perfectionism

(Sirois, 2015a), the current study demonstrated that the higher order personality factors associated with each of these traits are also linked to health behaviors through the common vector of affect balance. This raises the possibility that the SRRM may be useful for understanding how other midlevel traits that have similar links to Big Five traits may also be linked to health behaviors. For example, research on how mid-level traits such as procrastination, which is associated with high Neuroticism, and low Conscientiousness and Agreeableness (Steel, 2007), hinders the practice of health behaviors may benefit from taking a self-regulation resource perspective to better understand the processes involved.

Despite these empirical and theoretical contributions, the current findings should be considered in light of several limitations. Given the student sample, it is important to replicate the findings with other adult populations, as emerging adults (adults aged 18-25) which comprised the majority of this sample, are unique developmentally with respect to brain areas related to self-control, making them more susceptible to engage in emotion driven rather than rational behavior (Casey, Jones, & Hare, 2008). Nonetheless, the prospective design and relatively large sample are noteworthy methodological strengths that provide clear advances over previous research testing the SRRM. Future research should, however, endeavor to assess health the links between behaviors and affect using more sophisticated methods such as daily diary studies, and event sample methods to better capture the ongoing affective processes proposed to link Big Five traits to health behaviors. Although the indirect effects through affect were significant, they were small, an issue that may be due to assessing state affect at a single time point rather than at a time more directly linked to the practice of health behaviors. The latter approach would provide a more robust test of the SRRM and provide more compelling evidence that affective states are important factors for explaining the personality-health behavior link. In

addition, finding ways to more directly assess health behaviors than relying on self-report, which could be biased by personality traits, would provide more robust support for the SRRM.

Whereas previous research has noted links between Big Five traits and health behaviors, the current findings provide a process-oriented understanding of how *Stability*-related Big Five traits are linked to health-promoting behaviors over time. This extends previous research supporting a self-regulation resource perspective on personality and health behaviors, and highlights the importance of promoting and harnessing affect balance to maximize health-related outcomes.

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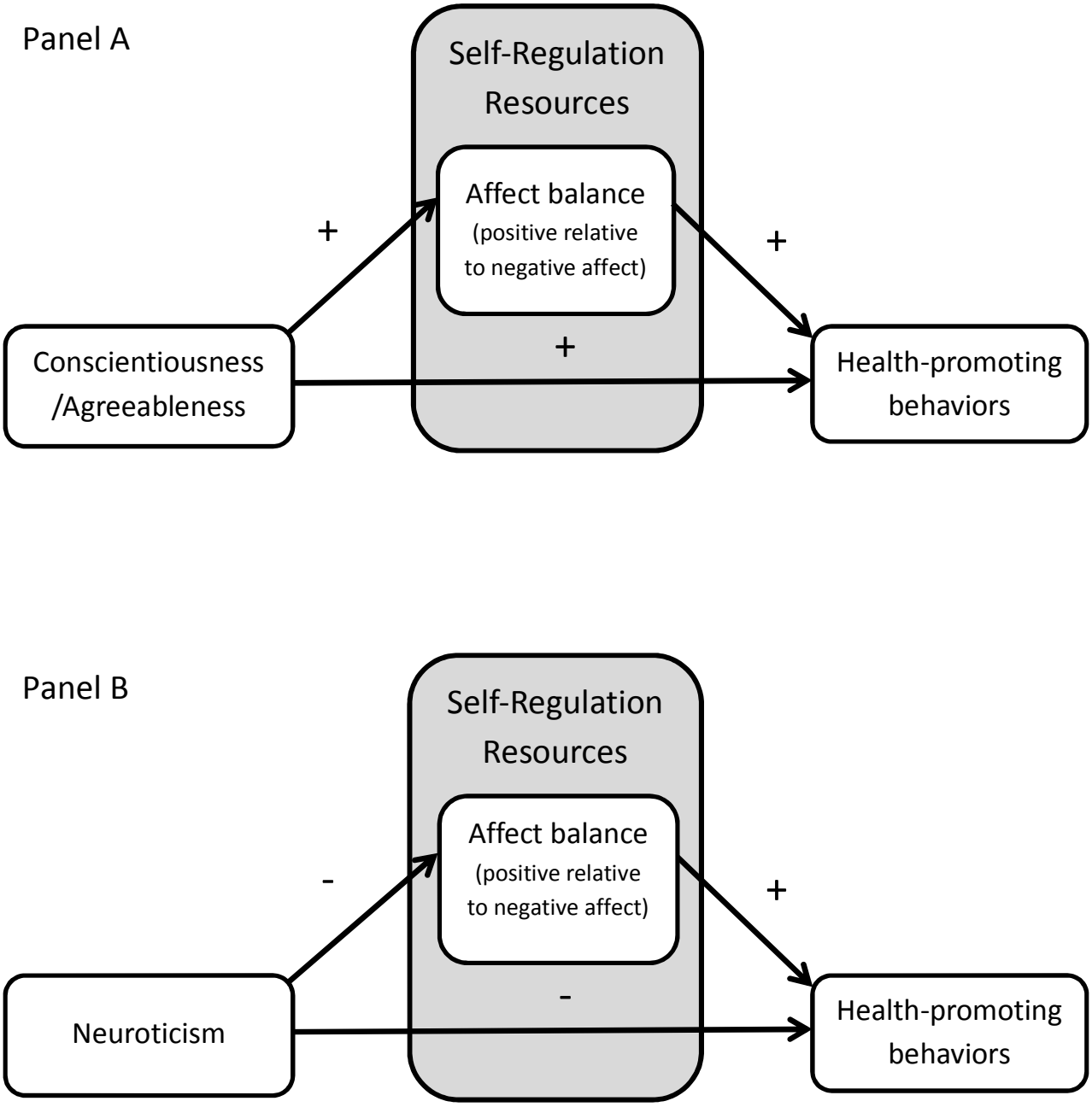

Figure 1: *Conceptual Diagram of the Self-Regulation Resource Model Linking Conscientiousness and Agreeableness (Panel A), and Neuroticism (Panel B) to Health-Promoting Behaviours Through Affect Balance.*

Table 1.

Bivariate Correlations Among the Personality Factors, Affect, and Health Behaviors (Time 2 N = 195).

Variable	1	2	3	4	5	6	7	8
1. Conscientiousness	---							
2. Agreeableness	.26**	---						
3. Neuroticism	-.18*	-.26**	---					
4. Negative affect	-.28**	-.25**	.33**	---				
5. Positive affect	.29**	.23**	-.28**	-.05	---			
6. Affect balance	.40**	.29**	-.43**	-.57**	.80**	---		
7. Health behaviors T1	.29**	.13	-.20**	-.13	.32**	.37**	---	
8. Health behaviors T2	.32**	.21**	-.21**	-.11	.38**	.31**	.85**	---
Mean	3.60	3.85	3.04	1.48	2.97	6.36	3.49	3.42
Standard deviation	.64	.60	.84	.59	.85	1.01	.61	.62

Note: *$p < .05$, **$p < .01$; T1 = Time 1, T2 = Time 2.

Table 2.

Indirect Effects of Conscientiousness (C), Agreeableness (A), and Neuroticism (N) on Time 2 Health Behaviors (HB) Through Affect Balance (AB) Controlling for Time 1 Health Behaviors.

Path	B (*SE*)	*t*	Indirect effect (SE)	BCA CIs	Model R^2	*F* (*df*)
C – AB	.53 (.12)	4.59**				
AB– HB	.05 (.02)	1.92*			.74	265.12** (2, 192)
C – HB	.05 (.04)	1.32				
			.02 (.01)	[.00, .06]		
A – AB	.50 (.12)	4.21**				
AB – HB	.04 (.02)	1.84			.74	268.54** (2, 192)
A – HB	.07 (.04)	1.80				
			.02 (.01)	[.00, .05]		
N– AB	-.45 (.08)	-5.47**				
AB – HB	.05 (.02)	2.13*			.74	260.47** (2, 192)
N – HB	-.01 (.03)	-0.40				
			-.02 (.01)	[-.05, -.00]		

Note: BCA CI = Bias corrected and accelerated 95 percent confidence intervals; Boot strapping analyses was conducted with 5,000 resamples; all effects are unstandardized; *$p < .05$, **$p < .01$.