Compensatory health beliefs (CHB) represent a strategy in which individuals believe they can compensate for, or negate, an unhealthy behavior by subsequently engaging in a healthy behavior (Knäuper, Rabiau, Cohen, & Patriciu, 2004). CHB represent the cognitive process of contemplating a healthy behavior to counteract an unhealthy behavior, but do not include the actual completion of the behavior itself. CHB can also be considered an affective state, as individuals reduce cognitive dissonance and guilt that arises from making recognizably unhealthy choices. Despite this potential benefit, the use of CHB has been linked to unhealthy outcomes (Knäuper et al., 2004). For example, the healthy behavior does not always nullify the unhealthy one such as exercise failing to counteract the unhealthy consequences of smoking. In addition, the use of CHB frequently coincides with engaging in an unhealthy behavior in order to justify its occurrence, but the compensatory behavior does not follow (e.g., planning to exercise later but not doing so). Therefore, no benefit is applied, and the negative impact of the unhealthy action is not reduced (Knäuper et al., 2004).

Rabiau, Knäuper, and Miquelon (2006)
developed a theoretical framework to explain how CHB are employed. They argued that unhealthy desires pitted against healthy goals create motivational conflict. Individuals have the option of changing their goals, resisting the desire, or engaging in CHB. Given these options, CHB are a relatively passive and simple way of responding to this conflict. The existence of this theoretical concept has received experimental support, especially in the context of dieting. Kronick and Knäuper (2010) presented female dieters with a high caloric temptation. Dieters who formed the intention to behaviorally compensate for giving into the temptation were more likely to indulge. In a similar study, dieters who held compensatory beliefs and formed intentions to compensate for caloric overindulgence were likely to consume more calories (Kronick, Auerbach, Stich, & Knäuper, 2011). Miquelon, Knäuper, and Vallerand (2012) likewise documented that dieters who engaged in compensatory thinking were less likely to be successful in achieving their overall dieting goals. Collectively, these studies have indicated that the use of CHB interferes with dieters’ ability to attain their weight loss goals.

CHB have also been demonstrated in the context of clinical populations where unhealthy behaviors may have more severe consequences. Täu and Băban (2008) examined the use of CHB in patients with heart disease. Their results suggested that CHB are linked to unhealthy eating choices. CHB were used more often by patients who failed to plan for unexpected situations in which they had to make dietary choices and by patients who were not as deeply concerned about the outcomes of their nutritional choices. Individuals who had a self-determined motivation or self-efficacy to meet their specific health goals were less likely to engage in CHB or were more likely to complete the compensatory behavior following the activation of CHB (Täu & Băban, 2008). The findings suggested that individuals may have characteristics such as feelings of self-efficacy that make them more or less likely to rely on CHB.

Adolescents also exhibit CHB use. For example, adolescents with type 1 diabetes who more frequently held CHB related to keeping track of their blood sugar had more difficulty adhering to their treatment plans (Rabiau, Knäuper, Nguyen, Sufrategui, & Polychronakos, 2009). This finding held true even for adolescents who were knowledgeable about diabetes and its potential health consequences. When the CHB scale was adapted to study smoking-specific CHB in adolescent smokers, results revealed that the more that smokers engaged in CHB, the less ready and willing they were to stop smoking (Radtke, Scholz, Keller, Knäuper, & Hornung, 2010). In other words, convincing themselves that they were compensating for smoking with other behaviors was linked to a continuation of the unhealthy smoking behavior. Although Täu and Băban (2008) demonstrated that self-efficacy reduced the use of CHB, Radtke et al. (2010) found that self-efficacy did not moderate the relation between smoking cessation readiness and CHB use in adolescents.

The previous research has clearly documented a relation between CHB use and unhealthy behavioral choices. In addition, previous research has provided evidence that self-efficacy or self-determined motivation can increase or decrease the use of CHB in adults. Täu and Băban (2008) found that CHB use is decreased when individuals have the self-efficacious belief that they are capable and able to avoid the unhealthy behavior. In contrast, Rabiau et al. (2006) proposed that CHB use increases when individuals are motivated by self-efficacy to engage in unhealthy behavior because they feel capable and able to also engage in the compensatory behavior. This mediating impact of self-efficacy was not seen in adolescents (Radtke et al., 2010). One possible explanation is that self-efficacy may require a certain level of cognitive development before being expressed in this context or that adolescents are more varied than adults in how self-efficacy influences their behavior. Another possibility is that self-efficacy simply is not a consistent predictor of CHB.

If self-efficacy does not consistently predict CHB use, the question arises as to whether there may be other mediating factors related to the application of CHB. For example, impulsivity has been linked to unhealthy behavior such as alcohol consumption and gambling (Braddock et al., 2011; Lovallo, 2013; Tang & Wu, 2012). Like CHB use, impulsivity also predicts greater difficulty in withstanding the temptation of high caloric snacks (Churchill & Jessop, 2011). The counterpart to this impulsivity data is that individuals who consider future consequences before acting are more likely to engage in healthy behaviors such as dieting and exercise (Adams & Nettle, 2009; Piko & Brassai, 2009). Because of their strong links to behavioral choices, it is likely that impulsivity and consideration of future consequences will also
be related to CHB.

Another factor that predicts health behavior is coping style. Coping styles are global strategies that people employ to deal with stressful situations. In general, active coping strategies such as exercising are linked to healthier outcomes than passive coping strategies such as ignoring a problem (Schmidt, Blank, Bellizi, & Park, 2012). CHB have been conceptualized as a strategy to cope with motivational conflict, cognitive dissonance, and guilt (Knäuper et al., 2004; Rabiau et al., 2006). Thus, CHB and coping may be related concepts.

Previous researchers established the link between CHB use and unhealthy behavioral choices, as well as postulated self-efficacy as a mediating factor with mixed empirical results. We examined whether previously unexplored factors such as impulsivity and consideration of future consequences may be more predictive of CHB than self-efficacy, with the goal of increasing our understanding of this relatively new construct. We also examined whether the specific strategy of CHB use, which occurs when a potentially stressful health decision must be made, relates to more global coping strategies. If so, CHB use may be part of a larger pattern of employing unhealthy strategies to deal with stressful situations.

In order to make comparisons with previous research, we assessed whether smoking or drinking alcohol was related to more frequently used CHB, and we asked participants one question to assess their current health level. Whereas previous research targeted dieters, smokers, or clinical patients, our study investigated CHB across adults to add to our knowledge about the prevalence and employment of this construct. The research was conducted across two studies, allowing for testing of these initial hypotheses followed by a refined examination of the salient results in relation to other variables.

Study 1: Relations Among CHB, Impulsivity, Consideration of Future Consequences, and Coping Styles
We hypothesized that:

1. CHB use would be positively associated with impulsivity and negatively associated with consideration of future consequences.

2. CHB use would be positively associated with maladaptive coping styles and negatively associated with adaptive coping styles.

3. Participants who smoked or drank alcohol would be more likely to engage CHB.

We did not make a directional hypothesis in regard to CHB use and self-reported perception of health because CHB use could give users a perception of healthiness, or CHB use could be a strategy to cope with perceptions of poor health. This element of the research was exploratory.

Method
Participants
Participants were 60 adults, 46 women, and 14 men, with a mean age of 29.12 years (SD = 12.54). Seventy-five percent identified as White American, 13% as Black American, and the remainder as other ethnicities. Seventy-five percent of participants self-reported as being nonsmokers, and 32% reported never drinking alcohol.

Materials
Participants responded to a questionnaire that included the CHB Scale (Knäuper et al., 2004). The CHB Scale assesses a participant’s likelihood of engaging in CHB. The scale consists of 17 items that include four areas where CHB may be used: substance use (i.e., alcohol, nicotine, and caffeine), eating and sleeping habits, stress, and weight regulation. A sample question for weight regulation is “Eating whatever one wants in the evening is OK if one did not eat much during the day.” Sample questions for substance abuse are “Exercising can compensate for smoking” and “Not drinking alcohol during the week can make up for the effects of drinking too much alcohol during the weekend.”

We asked participants “How often do you personally think the following?” and they responded on a Likert scale ranging from 1 (never) to 5 (always). A higher score indicates greater frequency of CHB related to that area of life. The published reliability for these scales is Cronbach’s alpha of .80 (Knäuper et al., 2004), and we calculated a Cronbach’s alpha of .79.

Participants responded to the Barratt Impulsiveness Scale (Patton, Stanford, & Barratt, 1995), a widely used 30-item, self-report measure of impulsiveness. Items are scored on a 4-point scale from 1 (rarely/never) to 4 (almost always/always). A sample item is “I say things without thinking.” Patton et al. (1995) reported internal consistency coefficients for the BIS-11 total score that range
Participants also responded to the Consideration of Future Consequences Scale (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994). This 12-item scale assesses how individuals consider future consequences when choosing their behaviors. However, we used eight items that have exhibited greater reliability than the original scale (Petrocelli, 2003). Responses are made on a 5-point scale, where 1 represents extremely uncharacteristic and 5 represents extremely characteristic, with some items reverse-scored. A sample item is “I only act to satisfy immediate concerns, figuring the future will take care of itself.” A higher score indicates greater consideration of future consequences. Strathman et al. (1994) reported internal consistencies ranging from .80 to .86. However, other researchers have reported reliabilities in the .72 to .77 range (Toepoel, 2010). Our Cronbach’s alpha for this scale was .65.

To examine coping styles, participants responded to the 18-item Coping Scale (Halverson, Bliese, Moore, & Castro, 1995). Responses are made on a Likert scale from 1 (never) to 5 (always). Coping was classified as maladaptive or adaptive. Maladaptive strategies included avoidant (e.g., ignoring the problem or finding ways to avoid dealing with it) and unhealthy (e.g., drinking alcohol or complaining to others) behaviors. Adaptive coping was construed as an individual engaging in an active behavior designed to solve the problem (e.g., considering different options or looking for information about choices). Our Cronbach’s alpha was .73 for the avoidant subscale, .65 for the unhealthy subscale, and .49 for the adaptive subscale. It is worth noting that reliabilities for these scales are lower than what is typically preferred because respondents are given a wide range of options; each respondent could engage in some but not all of the behaviors included in each subscale, which results in lower, but not surprising, internal consistency. Last, we asked participants for demographic information including a question to assess their current level of health on a 5-point scale, with a higher number representing better health.

Procedure
We used convenience sampling. Participants were recruited from undergraduate classrooms, a university waiting area, and the workplace of the researcher. These venues were chosen with the goal of recruiting a diverse range of participants. Participants were asked whether they were willing to take part in a research study. Upon agreeing, each participant was provided an informed consent letter in the presence of the secondary author. The author asked the participants if they had any questions and whether they wanted to continue. Adults who chose to participate were handed a survey, and the researcher moved away, providing the participants with privacy. Participants were given as much time as they needed to complete the survey, and surveys were placed in a large manila envelope by the participants upon completion. To further ensure participants’ confidentiality, the surveys were not removed from the envelope and viewed until the entire data set was collected. The university’s institutional review board approved the study. Participants received no incentives for participation, and all participation was voluntary.

Results
Higher CHB scores were positively correlated with impulsivity, \( r(58) = .43, p = .001 \), and negatively correlated with CFC, \( r(56) = -.44, p = .001 \). Participants who scored higher on overall CHB were more likely to engage in the two maladaptive coping strategies: avoidant coping, \( r(59) = .38, p = .003 \), and unhealthy coping, \( r(57) = .47, p < .001 \). These correlations represented medium effect sizes. CHB were not associated with adaptive coping strategies.

Participants’ mean rating of their overall health was 3.51 (SD = 0.95) on a 5-point scale. Participants’ health ratings did not predict CHB use. We compared self-reported smokers (\( n = 45 \)) to nonsmokers (\( n = 14 \)) and drinkers (\( n = 41 \)) to nondrinkers (\( n = 19 \)) using independent \( t \) tests. Compared to nonsmokers, participants who smoked had higher CHB scores, \( t(57) = -2.36, p = .02 \), reflecting a small effect size (.30). The two groups did not differ in terms of age, \( t(57) = -1.17, p = .25 \), ns, and the race and sex distribution for each group matched the sample as a whole. There was no significant difference in the CHB scores of participants who drank alcohol and those who did not, \( t(57) = -1.39, p = .17 \), ns. The two groups also did not differ in terms of age, \( t(57) = -1.14, p = .26 \), ns, and the race and sex distribution for each group matched the sample as a whole.

Discussion
We hypothesized that frequency of CHB use would be positively associated with impulsivity and negatively associated with consideration of future
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Consequences. This hypothesis was supported. The more heavily participants relied on CHB, the more impulsive and less concerned about the future they were, indicating a greater focus on immediate rewards than distal consequences. This finding matched previous research demonstrating that failure to consider future consequences is associated with risky behavior such as increased smoking (Adams & Nettle, 2009). If CHB offer a short-term solution to a challenging situation with potentially long-term consequences, then CHB are ostensibly more appealing to those who give more attention to immediate outcomes than future consequences. In other words, CHB may offer people a guilt-free way to indulge in their impulses and a way to rationalize the repercussions of their behavior. The concern is that, once the negative emotional component is minimized, unhealthy behaviors and the corresponding physical consequences are likely to increase.

Rabiau et al. (2006) originally hypothesized that self-efficacy was a personality characteristic that would increase CHB use, whereas Taut and Bában (2008) experimentally demonstrated that self-efficacy decreased CHB use. Our data suggested that impulsivity and low consideration of future consequences are two additional characteristics that influence CHB use. However, this case is less ambiguous because both variables increase the likelihood of an individual using CHB. Correlational research does not specify whether CHB allow the development of these characteristics or are a product of them, however the more logical explanation of the two options is that impulsivity and a lower concern for future consequences are catalysts for short-term unhealthy decisions. Impulsivity and lower consideration of future consequences can be considered trait-based characteristics, whereas CHB use is conceptualized as a strategy to deal with specific situations.

We also hypothesized that CHB use would be positively associated with maladaptive coping styles and negatively associated with adaptive coping styles. This hypothesis was partially supported. The more participants relied on CHB, the more they relied on maladaptive coping strategies. This finding suggested that CHB may be considered an unhealthy coping strategy that is distinct from but highly related to other unhealthy coping strategies. In other words, individuals who frequently engage in compensatory thinking in regard to health choices are also likely to deal with life stressors by avoidance. Similar to CHB, maladaptive coping strategies are a way of dealing poorly with cognitive stress. Avoidant coping and holding CHB share the additional characteristic of being passive, rather than active, reactions to external stressors.

In our results, CHB use was not related to reliance on adaptive coping strategies. In other words, some individuals with high CHB ratings may use healthy coping strategies and some may not. Thus, the presence of CHB does not represent the absence of healthy coping styles as we predicted. The Cronbach’s alpha for the scale was relatively low, which might have prevented our ability to establish a clear link between CHB use and healthy coping and was a limitation of this subscale analysis. Another plausible explanation is that the list of healthy coping behaviors used in our measure included behaviors that participants might have considered within CHB as compensation for unhealthy actions. For example, an individual who decided to exercise to compensate for smoking might have scored higher on the “consider different options” component of the adaptive coping behaviors measure, thus revealing a positive relation between CHB use and adaptive coping. In contrast, another individual might have planned to exercise as part of his CHB but lacked the “follow through” to ultimately take that positive action, resulting in a negative relation between CHB use and healthy coping.

The same argument may explain why our participants’ responses did not reveal a link between CHB use and perceptions of health. Some adults have CHB and follow through with the compensatory behavior, resulting in improved perceptions of self-health. Other adults may fail to engage in the compensatory behavior, resulting in decreased perceptions of self-health. We assessed health perceptions with one question, which was a limitation of this study. Congruent with previous research, we found the absence of healthy coping styles as we predicted. The Cronbach’s alpha for the scale was relatively low, which might have prevented our ability to establish a clear link between CHB use and healthy coping. In our results, CHB use was not related to smoking readiness and CHB use in adolescents.

Our analyses revealed that smokers were more likely to use CHB than nonsmokers, but this pattern was not true in relation to alcohol consumption. Smoking might have elicited a greater need for CHB use because any amount of smoking is known to be detrimental, whereas alcohol consumption is not always problematic. Radtke et al. (2010) found that adolescents who used CHB were more likely to continue smoking. Unlike other studies, Radtke et al. (2010) also found that self-efficacy did not moderate the relation between smoking cessation readiness and CHB use in adolescents. One possibility for these findings is that self-efficacy
is a developmental issue. In the context of our findings, an alternative is that the guilt from engaging in the completely unhealthy behavior of smoking elicits such a great need for CHB that self-efficacy becomes less relevant.

Individuals must have some basic knowledge of what is considered unhealthy (e.g., smoking is unhealthy), or they would not need CHB to reduce cognitive dissonance while contemplating an unhealthy choice. The question arises as to how greater health knowledge relates to CHB use, which was not clearly answered based on the single item in Study 1. Perhaps people with extensive health knowledge are more willing to engage in CHB because they experience more distress when they contemplate an unhealthy behavior, but knowing the full risks associated with an unhealthy behavior also means that more cognitive energy is required to rationalize CHB use. For example, individuals who know the full risks of smoking will have a more difficult time convincing themselves that an exercise class is an adequate compensation for smoking. CHB are a passive fix to an immediate problem, favored by people with impulsive tendencies who do not spend a great deal of time considering the future, so the more effort CHB require, the less they may be employed. Thus, it may be more likely that individuals with limited health knowledge find it easier to engage in CHB because they are only minimally aware of the consequences of their unhealthy choices.

In sum, the results from Study 1 demonstrated that individual characteristics such as impulsivity and reliance on maladaptive coping strategies are associated with increased employment of CHB. Participants who smoked also used CHB, but an increased use of CHB did not relate to participants perceiving themselves as less healthy. The purpose of the second study was to examine the connection between CHB and an individual’s knowledge about healthy behaviors, as well as how age and education relate to health knowledge and CHB use. In this study, the CHB scale was modified such that participants responded in terms of actual behavior rather than based on their general beliefs about how they and other people might behave. In Study 1, participants’ perceptions of their health was assessed with one item. In Study 2, health was assessed with a longer, more comprehensive measure. With a larger sample size, we also examined whether the relation between CHB and maladaptive coping seen in Study 1 would be maintained when participants were focused on their own behavior.

Study 2: Relations Between CHB, Coping Styles, and Health Perceptions

We hypothesized that:

1. CHB use would be positively associated with maladaptive coping styles and not significantly associated with adaptive coping styles.

2. CHB use would be negatively correlated with knowledge about healthy behaviors and with engagement in healthy behavior.

3. CHB use would be negatively correlated with age and education level.

Method

Participants

Participants were 140 adults, 116 women, and 24 men, with a mean age of 31.44 years (SD = 13.86). Of those, 84% identified as White American, 13% as Black American, and the remainder as other ethnicities. Ninety percent of participants had participated in education beyond high school, and the other 10% had earned either a GED or a high school diploma.

Materials

Participants responded to an online questionnaire. The survey included the same demographic questions from Study 1, with the addition of a question assessing participants’ formal educational level. We modified the original CHB Scale (Knäuper et al., 2004) to reflect personal ownership of the use of CHB. The modified instructions asked participants to “Answer the following based on your own beliefs and behaviors.” We reworded the questions from an impersonal statement to one in which the word you was inserted. For example, the item “ Skipping the main dish can make up for eating dessert” was changed to “Is eating dessert OK if you skip the main dish?” A modified sample question related to sleeping habits was, “Do you ever sleep in on the weekends to make up for lost sleep during the week?” Participants responded on the same Likert scale from 1 (never) to 5 (always) as was used in Study 1. A higher score indicated greater frequency of CHB use related to that area of life. This modified scale had a Cronbach’s alpha of .72, similar to that of the original scale.

In addition, we created a 14-item scale comprised of elements similar to those used in the Coping Scale (Halverson et al., 1995) and the
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Brief COPE (Carver, Scheier, & Weintraub, 1989). We used items from the Coping Scale that were more frequently selected by participants as coping behaviors and selected items from the Brief COPE that were relevant to our study’s focus. The questions were designed to measure the tendency toward an adaptive or maladaptive coping style, and participants were asked, “How often do you do the following when you are stressed?” Seven adaptive behaviors included changing the stressor, exercising, and viewing the situation in a different light (α = .71). Maladaptive strategies included ignoring the problem, drinking alcohol, and blaming self (α = .64). Again, this relatively low reliability score might have resulted from participants who engaged in some behaviors such as ignoring the problem but not every behavior such as drinking alcohol.

We created 20 original items inquiring about participants’ health beliefs, health knowledge, and health behaviors. Six questions asked participants to rate their knowledge on health topics such as sleep, exercise, and dietary guidelines. A sample question is, “I know the risks of smoking.” Six questions asked participants how often they engaged in specific healthy behaviors each week, for example, “How often do you engage in at least 30 min of heart rate elevating physical activity/exercise per week?” Five questions asked participants how often they felt they should engage in specific health behaviors, for example, “How often should you try to get at least eight hr of sleep per night per week?” Three additional questions asked participants to rate their current health, the healthiness of their daily habits, and how certain they were that they needed to change their behaviors in order to become healthier. All responses were made on a 5-point Likert-type scale with a higher number indicating greater knowledge or healthiness. These questions were created to obtain a personal assessment of the participants’ health knowledge and habits in the areas generally highlighted by the CHB Scale: stress, sleep, diet, and substance use (Knäuper et al., 2004).

Procedure

Participants were recruited via social media such as Facebook using a snowball sampling technique. Potential participants were provided with a link to the online survey and asked to post the link on their social media sites. The survey was posted for a period of three weeks. All participation was voluntary and anonymous, and the study was approved by the university’s institutional review board.

Results

Participants with higher CHB scores were more likely to use maladaptive coping strategies, r(122) = .47, p < .001, representing a medium effect size. CHB use was not associated with adaptive coping strategies. See Table 1 for all correlations.

Participants with lower CHB scores rated themselves as more knowledgeable about general health issues, r(124) = -.21, p = .02. When asked about specific health issues, participants with lower CHB scores reported that they had a greater knowledge of the minimum recommended amounts of physical activity needed to maintain health, r(122) = .35, p < .001, and were more knowledgeable about the health risks of stress, r(123) = .19, p = .04. On the other hand, the higher the CHB score, the more frequently participants believed a person could smoke without incurring any health risks, r(124) = .18, p = .04.

Participants with higher CHB scores rated their daily habits as less healthy, r(124) = -.23, p = .009. When we examined specific health behaviors, participants higher in CHB use reported eating fast food more often, r(124) = .22, p = .02. Despite these significant associations, higher CHB use did not predict participants’ feelings that their behaviors should change in order to become healthier. The CHB correlations reflected small effect sizes but painted a consistent picture of CHB being associated with lower health knowledge and unhealthy behaviors.

The higher the CHB score, the younger the participant, r(124) = -.41, p < .001, and the less formal education the participant had completed, r(124) = -.32, p < .001. Age and education were also positively correlated, r(140) = .47, p < .001. These correlations reflected medium effect sizes.

To further investigate these age-related findings, we divided participants into three age groups: 18 to 25 (n = 72), 26 to 40 (n = 35), and 41 to 68 (n = 33), and compared them with a Multivariate Analysis of Variance and Tukey’s posthoc analyses. Compared to the youngest group, the oldest respondents scored lower on CHB use, F(2, 121) = 6.29, p = .003, and higher on their self-reported knowledge of health issues, F(2, 137) = 3.47, p = .03. The three groups did not differ on how healthy they perceived their daily behaviors to be.

In order to test whether the variables that were related to CHB also created a predictive model of CHB use, we ran a multiple regression analysis. The predictors were maladaptive coping strategies, knowledge about general health issues,
healthiness of daily habits, age, and education, and the criterion variable was CHB score. The linear combination of variables was significantly related to CHB use, $F(5, 116) = 12.20, p < .001$. The sample multiple correlation coefficient was .59, indicating that approximately 35% of the variance of CHB use in the sample was accounted for with this model. Only two of the five indices were statistically significant ($p < .01$). The most meaningful predictors of CHB use were age ($\beta = -.159$, $p = .002$) and maladaptive coping ($\beta = .744$, $p < .001$). These variables alone accounted for 31% ($R = .558$; $R^2 = .31$) of the variance of CHB use, and the other variables contributed only an additional 4%.

The increased use of maladaptive coping styles was associated with participants reporting themselves to be less informed about general health issues, $r(136) = -.22, p = .009$, and to have daily habits that were less healthy, $r(136) = -.26, p = .002$. For specific behaviors, participants who were more likely to use maladaptive coping reported knowing less about physical activity guidelines, $r(135) = -.26, p = .003$, the risks of alcohol consumption, $r(135) = -.20, p = .02$, and the risks of stress, $r(136) = .20, p = .02$. Participants higher in maladaptive coping also exercised less frequently, $r(137) = -.26, p = .002$, ate fast food more often, $r(137) = .39, p < .001$, and got fewer nights of 8 hr or more of sleep, $r(135) = -.18, p = .03$. These correlations reflected small to medium effect sizes.

In contrast, participants with high adaptive coping strategies reported having daily habits that were healthy, $r(136) = .33, p < .001$. Specifically, these participants reported exercising for at least 30 min more times during a week, $r(136) = .37, p < .001$, eating more fresh fruits and vegetables, $r(135) = .30, p < .001$, and sleeping for 8 hr per night more times during a week, $r(136) = .17, p = .04$. Participants higher in adaptive coping strategies also reported being more knowledgeable about dietary guidelines, $r(135) = .25, p = .004$, physical activity guidelines, $r(134) = .28, p < .001$, the risks of stress, $r(135) = .26, p = .003$, and the importance of sleep, $r(135) = .22, p = .01$. These correlations reflected small to medium effect sizes.

The health related behaviors and knowledge that did not relate to CHB, adaptive coping, maladaptive coping or age were “I need to change certain behaviors in order to be healthier,” “I know the risks of smoking,” “How often should you engage in 30 min of heart-rate elevating physical activity per week,” “How often should you eat fresh foods per week,” “How often do you smoke per week,” and “How often should you get at least eight hr of sleep/night per week.”

**Discussion**

The results of this study, using a larger sample, supported the findings of Study 1 in relation to CHB and coping strategies. Using the modified scales that prompted participants to reflect on their own behaviors, CHB were once again concomitant with maladaptive coping styles and were unrelated to adaptive coping behaviors. Our findings also supported previous research demonstrating that adaptive coping is associated with better health, although maladaptive coping is associated with compromised health (Schmidt et al., 2012).

Study 2 results suggested that CHB are also linked to lower levels of health knowledge. Participants higher in CHB reported that they were less knowledgeable about health in general as well as less knowledgeable about the health aspects of physical activity, stress, and smoking. One possible explanation is that higher levels of health knowledge block the use of CHB because knowledge interferes with the reduction of cognitive

**TABLE 1**

<table>
<thead>
<tr>
<th>Significant Relations Among Compensatory Health Beliefs (CHB), Coping Styles, Age, and Health Behaviors</th>
<th>CHB</th>
<th>Adaptive Coping</th>
<th>Maladaptive Coping</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am well-informed about my general health.</td>
<td>-11</td>
<td>-12</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>My daily habits overall are healthy.</td>
<td>-23</td>
<td>.33</td>
<td>-26</td>
<td></td>
</tr>
<tr>
<td>I know and understand dietary guidelines.</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know and understand the minimum physical activity recommended for adults.</td>
<td>-35</td>
<td>.26</td>
<td>-26</td>
<td></td>
</tr>
<tr>
<td>I know the risks of alcohol consumption.</td>
<td>-20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know the risks of stress.</td>
<td>-19</td>
<td>.26</td>
<td>-20</td>
<td></td>
</tr>
<tr>
<td>I know the importance of sleep.</td>
<td>.22</td>
<td>.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you engage in 30 min of heart-rate elevating physical activity per week?</td>
<td>.37</td>
<td>-26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you eat fast food per week?</td>
<td>.22</td>
<td>.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you eat fresh fruits and vegetables per week?</td>
<td>.30</td>
<td>.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often is it safe to smoke per week?</td>
<td>.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you drink alcohol per week?</td>
<td>.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often is it safe to drink alcohol per week?</td>
<td>.19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *p < .05; **p < .01. CHB represent a strategy in which individuals believe they can compensate for, or negate, an unhealthy behavior by engaging in a healthy behavior (Knauper, Rabiau, Cohen, & Patriciu, 2004).
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dissonance. For example, if a person knows that one exercise class will not counteract smoking, then planning to exercise will not reduce the cognitive dissonance associated with smoking. CHB would therefore be ineffective and are unlikely to be used.

Iso-Ahola (2013) recently argued that exercise and other health behaviors are commonly conceptualized as a means to an end, rather than being viewed as having inherent value. In this case, individuals may be more prone to view a healthy behavior as something that must be done to compensate for a desirable unhealthy behavior. However, because exercise is the punishment for the desired behavior, it may not occur. Iso-Ahola’s (2013) rationale overlaps and supports the CHB construct.

Our findings also revealed that individuals higher in CHB reported that their daily habits were less healthy, and they were more likely to eat fast food. In other words, CHB use was linked to poorer health choices. These results may overlap our finding that CHB use was also linked to lower health knowledge. Adults whose understanding of health guidelines is incomplete have more difficulty adhering to those guidelines and are more likely to use CHB when confronted with making health choices. Täut and Băban (2008) reported similar findings; heart disease patients who were more concerned about their nutrition choices were less likely to employ CHB.

It is noteworthy that the relation between CHB and health knowledge, and CHB and health behaviors revealed small effect sizes, and these two variables were not highly predictive of CHB use. One possibility is that, because health is a societal concern, health education is widely available, resulting in commonalities of health knowledge. Another interpretation is that CHB use, leading to decreased distress, may be tempting for all individuals, regardless of their health. Rabiau et al. (2009) found that even adolescents who were knowledgeable about diabetes were vulnerable to compensatory thinking that interfered with their medical treatment. Finally, the weak relationship may reveal that the way people make health choices is a complex cognitive process impacted simultaneously by numerous variables. Our study alone added multiple predictive variables to the originally proposed model (see Figure 1).

In contrast, age emerged as a significant predictor in the likelihood of CHB use. Younger adults reported using CHB more frequently than older adults. Age was also positively associated with self-perceptions of greater health knowledge and higher education. Education combined with life experience may play a pivotal role in developing healthy cognitive strategies, thereby reducing the likelihood of CHB occurrence. This explanation may offer insight as to why self-efficacy influenced CHB use in adults but not in adolescents in previous research (Radtke et al., 2010; Täut & Băban, 2008). Adolescents may not have the education and experience to develop self-efficacy in relation to their own health in the same manner as older adults. This age-related finding may also be a result of unhealthy choices having more obvious consequences for older adults. For example, a young adult who does not get enough sleep may be able to function better than an older adult who has lost the same amount of sleep. In this case, it is easier for the young adult to engage the compensatory health belief that sleeping more on the weekend makes up for a lack of sleep during the week than it would be for an older adult.

**General Discussion**

Although CHB were consistently related to a maladaptive coping style, CHB and general coping style can still be considered distinct constructs. CHB are a situation-specific coping mechanism. They are activated in response to the particular discomfort that arises from cognitive dissonance related to choices that affect one’s health (Knäuper et al., 2004). Coping styles, as measured in these two studies, are more globally defined as strategies that people employ across myriad stressful situations. Our results revealed that people who use unhealthy global coping strategies are also likely to engage in condition-specific CHB in situations where health behavior decisions need to be made. If this is true, then these individuals are likely to experience negative outcomes related to unhealthy cognitive patterns in multiple realms of their lives.

A pattern emerges from this data pointing toward training as a valuable tool in overcoming CHB use and the associated negative outcomes. Age, tied to experience and education, was related to a decrease in the use of CHB. Individuals who are educated about health and encouraged to make thoughtful decisions may be more likely to reject compensatory beliefs. Previous research has demonstrated that better health decisions result when individuals utilize mindfulness, or increased attention, to their decisions (Black, Sussman, Johnson, & Milam, 2012). In other words, when people are trained to focus their attention and
knowledge on a specific behavior, they are less likely to behave impulsively and employ CHB. CHB use is a strategy used to reduce cognitive dissonance, and this reduction is highly motivating (Aronson & Mills, 1959). Thus, training efforts may need to include specific elements of dissonance-based interventions to be effective (Stice, Shaw, Becker, & Rohde, 2008; Stone & Fernandez, 2008). Stone and Focella (2011) argued that confronting individuals with their own hypocrisy in this manner is critical in improving decision-making.

Both of the current studies faced limitations. The unequal sample size in the two studies influenced the statistical power of the presented statistics. In Study 2, the use of multiple correlations raised the possibility of a family wise alpha error, which we attempted to address with multivariate analysis. As discussed, the adaptive coping scale had lower reliability than is preferred and may have masked a relation between reliance on CHB and adaptive coping. In addition, although similar to other research in this domain, self-report data has inherent limitations such as social desirability, self-serving bias, and inaccurate recall. We attempted to minimize social desirability as much as possible by allowing participants privacy and taking visible measures to ensure confidentiality.

The studies faced additional challenges in terms of generalizability. The participant pool included a disproportionate number of young adults who were recruited via convenience, rather than random, sampling. A larger percentage of male participants and more racial diversity among the participants would also have provided for improved generalizability. Despite these weaknesses, we demonstrated the existence of CHB in a broader sample than did previous studies (Radtke et al., 2010).

Future researchers may want to determine if CHB are specifically associated with maladaptive behaviors such as eating disorders, substance abuse, or overexercising. Such an investigation could lend more insight into the dynamics of those behaviors and allow clinicians and other therapeutic practitioners to more thoroughly understand the obstacles faced by clients attempting to correct those behaviors. CHB may also be more frequently used in certain populations such as individuals who follow strict dietary guidelines due to religious, ethical, or medical reasons. These situations are distinct from the aforementioned behaviors in that religious, ethical, or medical considerations do not stem from maladaptive strategies but instead may be viewed as imposed restrictions outside of individual control.

In addition, drawing parallels between CHB and excessive stress, methods of stress management, and the connection between stress and cognition could identify a new element in the exploration of how stress affects health. Because it appears that CHB and coping style are closely related, and stress management evolves from one’s coping mechanisms, the incorporation of the CHB model into the current inquiries on stress and health could yield new strategies to help individuals decrease distress and make healthier decisions.

Future researchers may also want to consider a more multidimensional assessment regarding how an individual’s temporal orientation influences CHB. The way in which an individual emotionally focuses on one aspect of time (e.g., past, present, or future) relative to other aspects of time, impacts that individual’s daily decisions, behaviors, and plans (Zimbardo & Boyd, 1999). For example, individuals who tend to focus on the present are more likely to self-report substance use (Keough, Zimbardo, & Boyd, 1999; Wills, Sandy, & Yaeger, 2001), but those who focus on the future are more likely to engage in proactive coping (Anagnostopoulos & Griva, 2012). The relation between temporal orientation and health-related outcomes may be moderated by an individual’s desire for control over the situation (Fieulaine & Martinez, 2010). CHB provide users with a perception that they are controlling the consequences of their unhealthy behaviors, but their assumptions are not always accurate. Thus, future researchers also may want to investigate how a desire for control relates to CHB and temporal orientation.

In sum, our studies revealed that impulsivity and less emphasis on future consequences are related to increased reliance on CHB. These variables appear to be stronger predictors for CHB use than self-efficacy, the previously postulated mediator. In addition, we found that an individual’s CHB tended to co-occur with an overall maladaptive coping style, suggesting that CHB use may be part of a larger strategy for dealing with stressful situations. Reduced reliance on CHB was related to age, education, health knowledge, and healthy behaviors in a nonclinical population. These findings added to our evolving understanding of this relatively new construct and suggested that improving individuals’ awareness of their own health-related cognitions may enable them to optimize their health choices.
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References


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