Cynical hostility is a personality trait consisting of a negative attitude, mistrustfulness, and ill will toward others (Smith, 1992, 1994). This construct has been associated with a range of negative health behaviors, including elevated rates of smoking, drinking, and caloric intake (Scherwitz et al., 1992), and poorer psychosocial and emotional health outcomes, including depression (Siegler et al., 2003). The health implications of cynical hostility are therefore wide ranging.

Considering that sleep is an important factor in physical and emotional health, it is important to fully understand if and how cynical hostility may be related to sleep outcomes. Several studies have examined a variety of hostility measures in relation to sleep problems. Using a measure of hostility derived from the Cook-Medley Hostility Scale (CMHS; Cook & Medley, 1954), Brissette and Cohen (2002) found that higher levels of cynical hostility were associated with greater difficulty with sleep onset and wakefulness. Other investigators have operationalized hostility differently. For example, a propensity to experience anger as measured by the Finnish Twin Study Hostility scale (FTSH) was associated with greater sleep disturbances and sleep that was not refreshing (Granö, Vahtera, Virtanen, Keltikangas-Järvinen, & Kivimäki, 2008).

In a study of prison inmates, the hostility subscale of the Aggression Questionnaire (AQ; Buss & Perry, 1992) that measures cognitive and ruminative characteristics of hostility was associated with shorter sleep duration and greater problems with sleep quality as measured by the Sleep Complaints Scale (SCS; Asplund, 1995; Ireland & Culpin, 2006).

Although these findings suggest that various dimensions of hostility are related to poor sleep, the relation of cynical hostility to sleep problems has not been sufficiently examined. Cynical hostility is particularly important to examine given that it is widely associated with poor health behaviors (Smith, 1992). In addition, investigators thus far have not examined whether depressive symptoms could act as a potential third variable that might account for the associations between hostility and sleep reported in the literature. Previous research has indicated that depression is statistically and conceptually related to various aspects of hostility (Beck, Lester, & Albert, 1973; Brooks, Girgenti, & Mills, 2009; Maier et al., 2009) and sleep (Sbarra & Allen, 2009). Clinically, sleep problems are a common symptom of depression (American Psychiatric Association, Diagnostic and Statistical Manual of
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Mental Disorders, 1994), and greater hopelessness and worthlessness as measured by the Beck Depression Inventory (BDI) are associated with fewer hours of average sleep duration (Brooks, Garrison, LaLonde, Quiñones, & Bathija, 2003). Cynical hostility also loaded with depressive symptoms in at least one factor-analytic study of anger, hostility, and depression measures (Maier et al., 2009). Greater cynical hostility scores have also been related to increased negative affect in response to reported interpersonal conflicts (Brisette & Cohen, 2002) and greater reactivity to interpersonal conflict (Räikkönen, Matthews, Flory, & Owens, 1999). In turn, greater cynical hostility predicts greater reported sleep disruption in proximity to the occurrence of interpersonal stressors (Brisette & Cohen, 2002).

Although the potential causal nature of these associations is not clear, it is nevertheless important to determine if the relations of hostility and sleep are independent of depression. The present study therefore extends the literature by using the most common measure of cynical hostility in the health literature and by controlling for the potential effects of depression on sleep. We hypothesized that hostility would predict poorer sleep as indicated by greater daytime fatigue, lower perceived sleep adequacy, and fewer average hours spent sleeping. However, because hostility is related to both depression and sleep and the fact that sleep problems are closely related to clinical manifestations of depression, we expected that depressive symptoms would account for variability in sleep measures better than hostility.

Method

Participants
Men (n = 62) from 18–30 years of age (M = 19.65; SD = 2.33) completed questionnaires at the end of a related psychophysiology protocol (Maier, Waldstein, & Synowski, 2003). The racial composition of the sample consisted of White (55%), Black (20%), Asian American (21%), and “other” (4%). Participants were recruited from introductory psychology courses. Each received $10 as well as extra course credit for participating. All participants reviewed and signed a consent form explaining the study and had an opportunity to pose any questions they had about participating.

Measures
We used the Cook-Medley Hostility Scale (CMHS; Cook & Medley, 1954) to measure cynical hostility. The scale has been validated to assess general mistrust and cynicism (Smith & Frohm, 1985). The CMHS is the most widely used hostility measure in the health psychology literature; it has been associated with a range of poor health outcomes (Miller, Smith, Turner, Guijarro, & Hallet, 1996). The CMHS consists of 50 items in true/false format. In tests of reliability, the CMHS has shown an internal consistency (alpha) as high as .85 (Barefoot, Dahlstrom, & Williams, 1983; Shekelle, Gale, Ostfeld, & Paul, 1983).

For sleep, participants rated how often they felt fatigue during the day and how often they perceived their sleep as adequate, using a 5-point scale (1 = never, 2 = rarely, 3 = occasionally, 4 = most of the time, 5 = always). Participants also listed their average duration of sleep on weekdays and weekends using an open-ended response format. Sleep duration is typically assessed in validated sleep measures such as the Pittsburgh Sleep Quality Index (PSQI) by measuring average hours of sleep over the past month (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989); however, we split our measure of sleep duration into two parts to better capture the potential variability between weekday and weekend sleep patterns reputed among college students. We assessed perceived adequacy of sleep because of the conceptual usefulness of examining differences in how individuals may qualitatively experience their sleep. Although investigators had not examined fatigue in the sleep literature we reviewed, we believed that this measure could be useful to examine in relation to cynical hostility because of a prior finding between a different form of hostility and poor sleep quality (Granö et al., 2008).

We measured depressive symptoms with the BDI (Beck, 1987). The BDI assesses a range of mild to severe depressive symptoms by asking respondents to rate the degree to which they are experiencing various aspects of depression. The BDI is a highly reliable instrument with an internal consistency of .92 for men and .91 for women in one analysis (Osman, Kopper, Barrios, Gutierrez, & Bagge, 2004). Additionally, past investigations have used the BDI as a means of measuring depression in relation to sleep and cynical hostility (Brooks et al., 2003; Maier et al., 2009).

Data Analysis Approach
After dropping one subject with an unrealistic response for hours of sleep, we analyzed 62 subject responses. We first examined the relations among sleep measures, the CMHS, and the BDI.
using Pearson correlations. Because of the close association of depressive symptoms with sleep, we then controlled for depression scores. Using each sleep measure as the outcome variable in separate hierarchical linear regression models, we entered BDI scores in the first step and CMHS scores in the second step.

Results

Means for all measures appear in Table 1. Prior to regression testing, Pearson correlations indicated that hostility and depression were positively associated with fatigue, $r_{60} = .33$ and .49, respectively, $p < .01$, but not other sleep measures (see Table 2). After entering depression in the first step of the regression model to control for its effects on fatigue, the association between hostility and fatigue was not significant, $p > .05$; see Table 3. Depression scores did, however, account for a significant proportion of variance on fatigue, $\Delta R^2 = .24$, $p < .001$. Although the model predicting weekend sleep from hostility and depression was not significant, $p = .08$, hostility accounted for unique variance in sleep duration on weekends, with greater hostility associated with fewer hours of sleep, $\Delta R^2 = .07$, $p < .05$. Results yielded no other significant relations prior to or following hierarchical linear regression pertaining to the hypotheses, $p > .05$.

### Table 1

<table>
<thead>
<tr>
<th>Measure</th>
<th>$M$</th>
<th>$SD$</th>
<th>range</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMHS</td>
<td>23.66</td>
<td>7.52</td>
<td>(8-39)</td>
<td>.82</td>
</tr>
<tr>
<td>BDI</td>
<td>7.31</td>
<td>5.52</td>
<td>(0-23)</td>
<td>.82</td>
</tr>
<tr>
<td>Fatigue</td>
<td>2.48</td>
<td>.91</td>
<td>(1-4)</td>
<td>.82</td>
</tr>
<tr>
<td>Sleep Adequacy</td>
<td>3.16</td>
<td>.88</td>
<td>(1-5)</td>
<td>.82</td>
</tr>
<tr>
<td>Sleep duration on weekdays (hrs)</td>
<td>6.50</td>
<td>1.17</td>
<td>(3-9)</td>
<td>.82</td>
</tr>
<tr>
<td>Sleep duration on weekends (hrs)</td>
<td>7.92</td>
<td>1.43</td>
<td>(4-10.5)</td>
<td>.82</td>
</tr>
</tbody>
</table>

Note. CMHS = Cook Medley Hostility Scale; BDI = Beck Depression Inventory; $\alpha$ = Cronbach’s Alpha.

### Table 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>CMHS</th>
<th>BDI</th>
<th>Fatigue</th>
<th>Sleep Adequacy</th>
<th>Hrs Weekdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI</td>
<td>.50</td>
<td>***</td>
<td>.33</td>
<td>-.21</td>
<td>-.13</td>
</tr>
<tr>
<td>Fatigue</td>
<td>.49</td>
<td>***</td>
<td>.32</td>
<td>-.15</td>
<td>-.05</td>
</tr>
<tr>
<td>Sleep Adequacy</td>
<td>-.27</td>
<td></td>
<td>-.19</td>
<td>-.72</td>
<td>-.16</td>
</tr>
<tr>
<td>Hrs Weekdays</td>
<td>-.24</td>
<td></td>
<td>-.24</td>
<td>-.24</td>
<td></td>
</tr>
</tbody>
</table>

Note. BDI = Beck Depression Inventory; CMHS = Cook Medley Hostility Scale; Hrs = average hours slept.

### Table 3

<table>
<thead>
<tr>
<th>Full Model</th>
<th>Predictor Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td><strong>$F$</strong></td>
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<tr>
<td>Daytime Fatigue</td>
<td>9.60</td>
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<tr>
<td></td>
<td>CMHS</td>
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<tr>
<td>Sleep Adequacy</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>CMHS</td>
</tr>
<tr>
<td>Hrs Weekdays</td>
<td>.51</td>
</tr>
<tr>
<td></td>
<td>CMHS</td>
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<tr>
<td>Hrs Weekends</td>
<td>2.68</td>
</tr>
<tr>
<td></td>
<td>CMHS</td>
</tr>
</tbody>
</table>

Note. Hrs = average hours slept; BDI = Beck Depression Inventory scores entered in first step of the regression model; CMHS = Cook Medley Hostility Scale scores entered in last step of the regression model. $\beta$ = Standardized regression coefficients at last step of model with all variables included. $\Delta R^2$ = Proportion of variance accounted for by variable at the step entered (BDI first, CMHS second).
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Discussion

Neither depression nor hostility significantly predicted perceived adequacy of sleep, average sleep on weekdays, or average sleep on weekends. Although both cynical hostility and depression related to greater fatigue, depression was more strongly associated. This finding is consistent with the fact that fatigue is one of several possible symptoms of clinical depression (DSM-IV, 1994). We note, however, that our entirely male sample limits the generalizability of these findings to women, especially given that there are gender differences in both hostility (Maier et al., 2009) and depression (DSM-IV, 1994).

Although depression accounted for greater variability in fatigue than did hostility, it is still possible that hostility is an important construct to examine with regard to other aspects of sleep. For example, the magnitude of associations between sleep amount and adequacy appeared greater for hostility than for depression. Although we did not conduct statistical tests between these sets of correlations, this pattern of findings suggests that the associations of hostility and depression with sleep may differ depending on the domain of sleep being examined.

In addition, the sample size of this study may have limited the statistical significance of the findings. A power analysis (Faul, Erdfelder, Buchner, & Lang, 2009) using the average of the observed correlations in this study (r = .16) estimated that a sample of 220 subjects would be needed to detect a significant effect at the power level observed for fatigue in this study (.77). The select nature of the sample may also have limited the results, considering that the average CMHS score of this sample (M = 23.66, SD = 7.52) appeared lower than normative data for young men (M = 25.81, SD = 7.80) reported elsewhere (Maier et al., 2009). It is possible that levels of hostility may have been too low to sufficiently impact the sleep domains that we measured. Although the correlations between hostility and sleep were not statistically significant, the directions of effects are consistent with theoretical expectations of poorer health behaviors associated with hostility. The size of the correlations (ranging from -0.13 to -0.21) could potentially have clinical significance, should these effects be replicated in future research.

Future research in this area may benefit from some measurement considerations. First, we rationally derived the sleep measures used here and, although some were similar to those used in validated measures such as the PSQI (Buysse et al., 1989), they have not been used in prior research. The PSQI is a self-report questionnaire designed to gauge sleep quality and disturbances over a one-month interval. Because the PSQI has been widely used and validated in sleep research and clinical applications, the domains measured by it, such as sleep latency and interruptions of sleep, may prove to be an effective tool in measuring a range of sleep problems in future research. Finally, it is possible that any disruption in sleep due to cynical hostility may vary over time and circumstances in a way that our measures did not capture (Brissette & Cohen, 2002; Smith, Glazer, Ruiz, & Gallo, 2004). For example, because a high degree of cynical hostility is associated with interpersonal stress (Smith, 1992), any effect of hostility on sleep may be better measured by a question such as, “How many times a week do you feel you lose sleep after having conflict with other people?” Similarly, assessing participants over time may allow for periodic assessment of conflict-related sleep loss.

This study adds to the literature by taking into account the role of depression in the relation between cynical hostility and sleep. Often hostility and depression are examined separately; however, there is growing evidence that they are related (Maier et al., 2009). Although causal associations are not clear thus far in the literature, it is possible that hostility plays a causal role in depression. In one recent study, hostility temporally preceded depressive symptoms in an adult sample (Stewart, Fitzgerald, & Kamarck, 2010). This finding, along with our results, suggests that future investigators may consider examining depression as a mediating factor in the association between hostility and sleep problems. Even though hostility is considered a dispositional construct, and thus would precede depression, it is also possible that depression has a causal influence on aspects of cynical hostility. Likewise, it is reasonable to suggest that sleep difficulties could affect the experience of depressive symptoms, particularly fatigue. Nevertheless, the finding that depression statistically accounted for the association between hostility and fatigue in this study suggests that depression is important to consider as a potential mediator in prospective studies of hostility and sleep.

References


