Correlating Barriers to Medication Adherence With Trait Anxiety, Social Stigma, and Peer Support in College Students With Chronic Illness

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ABSTRACT. Taking one’s prescribed medication is an important aspect of chronic illness management. It is important to better understand individual and community factors that may be associated with barriers to medical adherence. Eighty-three undergraduate students with a chronic illness took an online survey assessing perceived barriers to medication adherence, levels of anxiety, social stigma, and peer support. Participants reported on their chronic illness diagnosis. Anxiety and social stigma were positively correlated with barriers to medication adherence, \( p < .001 \), and peer support was negatively correlated with barriers to medication adherence, \( p = .02 \). Participants with a psychological illness reported statistically significantly higher levels of anxiety, \( p = .007 \), and social stigma, \( p = .002 \), than participants with a medical illness. This study contributes to the growing literature examining factors that may be associated with college students’ medication adherence.

Keywords: barriers, medication adherence, college students, chronic illness

Managing a chronic illness may require a variety of activities recommended or prescribed by one’s doctor including taking prescribed medications (DiMatteo et al., 2012). However, adherence to a treatment regimen may be difficult or not possible for many reasons: Patients may never begin or may stop their medication, they may experience problems with executive functioning, they may not have adequate knowledge, and they may experience low motivation (Cushman et al., 2020; Ruppar, 2017).

The lack of adherence to a treatment regimen can have a negative impact on one’s health, and it can frustrate the individual with the chronic illness and their medical provider (DiMatteo et al., 2012). Patient nonadherence negatively impacts the health care system in the form of increased health care costs. Approximately $100–300 billion of U.S. direct care healthcare dollars are associated with nonadherence each year (Ruppar, 2017). Because 50–75% of children and adolescents with chronic illnesses are nonadherent, it is especially important to examine medication adherence in pediatric populations with chronic illnesses (Modi et al., 2012). For example, nonadherence in adolescents with cancer puts them at risk of lower treatment efficacy and increased risk of relapse (Butow et al., 2010). Additionally, nonadherence affects about 40–67% of adolescent and young adult transplant recipients (Quast et al., 2020). Research with this population has demonstrated how nonadherence behaviors may be stable over time. Barriers to medication adherence remained the same immediately posttransplant to 18 months later in a study with adolescent transplant recipients (Simons et al., 2010).

College students living away from home have primary responsibility for managing their chronic illness. This is likely different than the experiences of adolescents living at home, who may still have one or more adults assisting with their daily illness.
self-management responsibilities. Although most college students find this time of transition challenging due to increased independence and responsibility, college students with chronic illnesses face even more challenges in being solely responsible for maintaining their health (Sharkey et al., 2017).

Existing research has identified many barriers to medication adherence. Although many studies have identified barriers to medication adherence using self-report measures (Bullington et al., 2007; Dziuban et al., 2010), some studies have accomplished the same objective using structured interviews (Smith et al., 2008). Regardless of the method of the study, research has suggested that barriers to medication adherence include lack of privacy, frequency of taking medication, treatment interfereing with freedom, and fear of peer relationships being negatively affected (Bullington et al., 2007; Dziuban et al., 2010; Hnaghoj & Boisen, 2014; Smith et al., 2008).

Modi et al. (2012) developed a model of self-management behaviors that explains the systems and factors that contribute to medication regimen adherence in pediatric populations diagnosed with a chronic illness. This model depicts how individual, family, community, and health care system levels influence medication adherence. Further, modifiable and nonmodifiable domain-specific influences impact self-management through cognitive, emotional, and social processes. Self-management processes are the actions that a person takes to treat chronic illnesses, modifiable influences are components of disease management that can be changed with intervention, and nonmodifiable influences are components of disease management that cannot be changed. Modifiable individual (i.e., anxiety) and community (i.e., peer support and social stigma) factors were selected for the present study.

Anxiety
Anxiety is defined as “a mental state characterized by an intense sense of tension, worry or apprehension relative to something that might happen in the future” (Saviola et al., 2020, p.1). College students with chronic illnesses have a higher risk of increased levels of anxiety compared to college students without chronic illnesses (Bhattacharya et al., 2014; Gray et al., 2011; Sharkey et al., 2017). Adolescents with chronic illnesses may have a higher risk of developing anxiety due to the unpredictable nature of many chronic illnesses (Gray et al., 2011). Anxiety has been associated with disease outcome and may exacerbate illness symptoms (Bhattacharya et al., 2014; Gray et al., 2011). Additionally, anxiety is correlated with greater difficulty adhering to treatment regimen (Gray et al., 2011; Modi et al., 2012).

Peer Support
Adolescent peer relationships can influence how adolescents with chronic illnesses manage their health (Modi et al., 2012). Peer support describes a positive relationship among multiple individuals roughly the same age who can depend on one another, empower, and encourage each other (Vayshenker et al., 2016). To reduce peer attention to their illness, some adolescents may rely less on peer support (Modi et al., 2012). Research has shown that adolescents endorse the desire to be “normal” and a lack of social support as significant barriers to medication adherence (Logan, 2003; Simons et al., 2009). Further, adherence has also been shown to be positively correlated with family and social support (Butow et al., 2010).

Social Stigma
One salient social influence is social stigma. Social stigma is defined as expectations given and spread by society typically regarding an illness and which tend to have negative connotations (Raque-Bogdan, 2019). Adolescents with asthma reported that one barrier to medication adherence is placing high importance on social influences (Rhee et al., 2009). Auslander and colleagues (2010) examined barriers to medication adherence among adolescents with type 2 diabetes and found that two types of stigma were a major barrier to medication adherence: the fear of not fitting in with peers and stigma from insurance companies associated with the disease itself. Concerns about stigma may stem from fear of being isolated and labeled as different than one’s peers (Smith et al., 2008).

The purpose of the present study was to determine associations between barriers to medication adherence and anxiety, peer support, and social stigma in college students with chronic illnesses. It was hypothesized that more barriers to adherence would be associated with higher levels of trait anxiety, less perceived peer support, and higher perceived social stigma.

Method

Procedures
The study was approved by the institutional review board at the authors’ institution (HR-3524). Participants were recruited for this study via a
weekly university email and flyers that were posted in the university’s medical clinic, Office of Disability Services, academic buildings, and apartments and residence halls on campus. The flyer stated that participants must be currently enrolled at the university, 18–23 years old, English speaking, diagnosed with a chronic medical condition, and regularly taking prescribed medication at least once a week. Graduate students were excluded from participating.

Participants

Of the 120 people who responded to the survey, 31 did not meet the eligibility criteria, and six partially completed the questionnaires. Thus 83 participants (88.0% women, 8.4% men, and 3.6% nonbinary; mean age = 20.12 years, SD = 1.32; 83.1% White or European American, 3.6% Asian American, 2.4% Black or African American, 2.4% Multiracial, 1.2% American Indian/Alaskan Indian, 1.2% Middle Eastern, 1.2% Native Hawaiian or other Pacific Islander, and 4.8% Did not respond; 90.4% Not Hispanic or Latina/o and 9.6% Hispanic or Latina/o; see Table 1) completed all demographic information and measures. Approximately half (51.8%) of participants had a medical illness, less than half (43.4%) had a psychological illness, and 4.8% had both. Of those with medical illnesses (see Table 2), there was great variability in the type of illness reported with the most participants (21.3%) reporting a gastrointestinal condition. Numerous psychological conditions were reported with depression being the most common (62.5%). The average age at chronic illness diagnosis was 14.55 years with a standard deviation of 4.35.

Measures

The Spielberger State-Trait Anxiety Inventory (STAI Form Y-2; Spielberger et al., 1983) is made up of 20 statements (e.g., “I worry too much over something that doesn’t really matter.”) that evaluate overall levels of trait anxiety, not specific to one point in time. Responses are given on a 4-point scale (1 = almost never to 4 = almost always); nine items are reverse scored. The sum of all items is then calculated.

### Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
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<tbody>
<tr>
<td>Gender</td>
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<tr>
<td>Women</td>
<td>73</td>
<td>(88.0%)</td>
</tr>
<tr>
<td>Men</td>
<td>7</td>
<td>(8.4%)</td>
</tr>
<tr>
<td>Nonbinary</td>
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<td>(3.6%)</td>
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<td>Race</td>
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<td>White or European American</td>
<td>69</td>
<td>(83.1%)</td>
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<tr>
<td>Asian American</td>
<td>3</td>
<td>(3.6%)</td>
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<tr>
<td>Black or African American</td>
<td>2</td>
<td>(2.4%)</td>
</tr>
<tr>
<td>American Indian/Alaskan Indian</td>
<td>1</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>Middle Eastern</td>
<td>1</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>Native Hawaiian or other Pacific Islander</td>
<td>1</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>Multiracial</td>
<td>2</td>
<td>(2.4%)</td>
</tr>
<tr>
<td>Did not respond</td>
<td>4</td>
<td>(4.8%)</td>
</tr>
<tr>
<td>Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>Hispanic or Latina/o</td>
<td>8</td>
<td>(9.6%)</td>
</tr>
<tr>
<td>Not Hispanic or Latina/o</td>
<td>75</td>
<td>(90.4%)</td>
</tr>
<tr>
<td>Year in School</td>
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<td></td>
</tr>
<tr>
<td>First-year</td>
<td>17</td>
<td>(20.5%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>24</td>
<td>(28.9%)</td>
</tr>
<tr>
<td>Junior</td>
<td>13</td>
<td>(15.7%)</td>
</tr>
<tr>
<td>Senior</td>
<td>29</td>
<td>(34.9%)</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Medical Illnesses (n = 47)</th>
<th>n</th>
<th>%</th>
<th>Psychological Illnesses (n = 40)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal</td>
<td>10</td>
<td>(21.3%)</td>
<td>Depression</td>
<td>25</td>
<td>(62.5%)</td>
</tr>
<tr>
<td>Neurological</td>
<td>7</td>
<td>(14.9%)</td>
<td>Anxiety</td>
<td>19</td>
<td>(47.5%)</td>
</tr>
<tr>
<td>Thyroid-related</td>
<td>7</td>
<td>(14.9%)</td>
<td>ADHD</td>
<td>8</td>
<td>(20.0%)</td>
</tr>
<tr>
<td>Rheumatic</td>
<td>6</td>
<td>(12.8%)</td>
<td>Eating disorder</td>
<td>3</td>
<td>(7.5%)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>5</td>
<td>(10.6%)</td>
<td>PTSD</td>
<td>3</td>
<td>(7.5%)</td>
</tr>
<tr>
<td>Reproductive</td>
<td>4</td>
<td>(8.5%)</td>
<td>Bipolar disorder</td>
<td>2</td>
<td>(5.0%)</td>
</tr>
<tr>
<td>Blood-related</td>
<td>3</td>
<td>(6.4%)</td>
<td>OCD</td>
<td>2</td>
<td>(5.0%)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>3</td>
<td>(6.4%)</td>
<td>Autism spectrum disorder</td>
<td>1</td>
<td>(2.5%)</td>
</tr>
<tr>
<td>Dermatologic</td>
<td>3</td>
<td>(6.4%)</td>
<td>Panic disorder</td>
<td>1</td>
<td>(2.5%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2</td>
<td>(4.3%)</td>
<td>Multiple diagnoses</td>
<td>1</td>
<td>(2.5%)</td>
</tr>
<tr>
<td>Chronic infection</td>
<td>1</td>
<td>(2.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep-related</td>
<td>1</td>
<td>(2.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary</td>
<td>1</td>
<td>(2.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple diagnoses</td>
<td>3</td>
<td>(6.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Four participants (4.8%) had both a medical and psychological illness, and their diagnoses were included in both groups. ADHD = Attention-Deficit/Hyperactivity Disorder; PTSD = Posttraumatic Stress Disorder; OCD = Obsessive Compulsive Disorder.
higher total scores indicate higher levels of trait anxiety. Evidence of validity has been obtained in previous studies that used a college student population (Pang et al., 2019). The Cronbach’s alpha for the scale in the present study was .92.

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) has 12 statements about social support in the form of family, friends, or a significant other (e.g., “I can count on my friends when things go wrong.”). Participants rate each item on a Likert scale (1 = very strongly disagree to 7 = very strongly agree). Subscales (with four items per subscale) can be calculated for support from family, friends, and significant others. In this study, because the construct of interest was peer support, only responses for the friends and significant other subscales were used and combined for a total peer support score. The responses for those eight items were summed and divided by the number of items to obtain a mean score. Higher scores indicate more social support. Previous studies have found evidence for the validity of this measure in a college student population (Zhang et al., 2019). The Cronbach’s alpha for the combined significant other and friends subscales was .90 in the present study.

The Stigma Scale for Chronic Illnesses-Short Form (SSCI-8; Molina et al., 2013) is comprised of eight statements about stigma experienced as a result of a chronic illness (e.g., “Because of my illness, some people avoided me.”). Participants rate each item on a 5-point scale (1 = never to 5 = always). The sum of scores is then calculated with higher scores indicating more social stigma experienced. This measure had good internal consistency with a Cronbach’s alpha of .83 in the present study.

The Adolescent Medication Barriers Scale (AMBS; Simons & Blount, 2007) is comprised of 17 statements regarding possible barriers to medication adherence (e.g., “I feel that it gets in the way of my activities.”) that participants rate on a Likert scale (1 = strongly disagree to 5 = strongly agree). The sum of all responses is calculated to get a final score; higher scores indicate more barriers to medication adherence. Research has provided evidence of validity for this measure in a population of adolescents and young adults aged 12–20 years, which overlaps with the college student population used in the current study (Quast et al., 2020). In the present study, the Cronbach’s alpha was .82.

Demographic characteristics of participants were obtained by asking participants to indicate their age, gender, race/ethnicity, year in college, age at illness diagnosis, type of chronic illness, and medication taken to treat the chronic illness. A physician reviewed the participants’ self-reported medical conditions to ensure that they were correctly classified and summarized.

### Results

Consistent with the hypothesis, more barriers to medication adherence were associated with higher levels of anxiety, $r = .44$, $p < .001$, and higher levels of social stigma, $r = .45$, $p < .001$. More barriers to medical adherence were associated with lower levels of peer support, $r = -.25$, $p = .02$ (see Table 3). Multiple linear regression was used to test if barriers to medical adherence was significantly predicted by anxiety, social stigma, and peer support. The overall regression was statistically significant, $F(3,79) = 9.10$, $p < .001$, and explained 29% of the variance. Anxiety, $\beta = .27$, $p = .03$, and social stigma, $\beta = .30$, $p = .01$, were significant predictors of barriers to medical adherence, but peer support was not a statistically significant predictor, $\beta = -.01$, $p = .95$.

Post-hoc analyses were done (a) to examine the pattern of correlations for the two subgroups (i.e., participants with a medical illness and participants with a psychological illness) and (b) to examine differences in the constructs of interest for the two subgroups. For analyses comparing the two subgroups, the total sample size was $n = 79$ because four participants reported both a medical illness and a psychological illness. The pattern of correlations for the two subsamples was similar to one another and to the full sample (see Table 3). When comparing the two subgroups, there were no statistically significant differences for the two subgroups for barriers to medication adherence, $t(77) = -1.40$, $p = .17$, and levels of peer support, $t(77) = 1.35$, $p = .18$. Participants with a psychological illness reported higher levels of anxiety, $t(77) = -2.78$, $p = .007$, and social stigma, $t(77) = -3.20$, $p = .002$, than participants with a medical illness.

#### TABLE 3

<table>
<thead>
<tr>
<th>Construct</th>
<th>Total Sample</th>
<th>Medical Illness (n = 43)</th>
<th>Psychological Illness (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>.43***</td>
<td>.35**</td>
<td>.56**</td>
</tr>
<tr>
<td>Peer support</td>
<td>-.25*</td>
<td>-.26</td>
<td>-.24</td>
</tr>
<tr>
<td>Social stigma</td>
<td>.45**</td>
<td>.38**</td>
<td>.53**</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01, ***p < .001.
Associations among the constructs were examined separately for participants with a medical illness and a psychological illness (see Table 4).

**Discussion**

The purpose of this study was to gain a better understanding of the associations between barriers to medication adherence and anxiety, peer support, and social stigma in college students with chronic illness. The results of the present study support all proposed hypotheses. Although not expected, a comparable number of participants identified as having a medical illness or a psychological illness, which allowed for comparison between these two subgroups of participants.

The results of this study are consistent with existing literature that has found a positive correlation between anxiety and having more challenges adhering to a prescribed treatment regimen (Gray et al., 2011; Modi et al., 2012). Unlike previous studies (Bhattacharya et al., 2014; Gray et al., 2011; Sharkey et al., 2017), this study did not compare anxiety levels in college students without chronic illness to college students with chronic illness. This study utilized the Spielberger State-Trait Anxiety Inventory (Spielberger et al., 1983), which assesses trait anxiety; future research may consider using different questionnaires to assess different dimensions of anxiety. For example, the Beck Anxiety Inventory assesses somatic symptoms of anxiety, and the Hospital Anxiety and Depression Scale—Anxiety assesses anxiety in people diagnosed with medical conditions (Julian, 2011). It may be informative to understand whether different dimensions of anxiety are related in similar or different manners to medication adherence.

Similar to research reviewed by Ahmad and Sorensen (2016), which found peer social support to promote adherence to asthma medication, this study found a negative correlation between peer support and barriers to medication adherence. Specifically, college students who had higher levels of peer support had fewer barriers to medication adherence. However, peer support was not a significant predictor of medication adherence when entered with other variables in a multiple regression. Peer relationships impact whether and how adolescents with chronic illness follow their treatment regimen (Modi et al., 2012). The work of Saylor et al. (2018) highlights how young adults increasingly rely on peers for support, and in doing so, they feel more social connection and less anxiety and depression related to their illness.

The positive correlation between social stigma and barriers to medication adherence found in this study is consistent with Auslander et al. (2010), which found stigma to be a barrier to medication adherence. Adolescents’ desire for others to view them as “normal” (Logan, 2003; Simons et al., 2009) highlights the large impact social stigma can have on their behavior, including adherence to medication regimen. Future research might consider an intervention addressing social stigma and its impact on treatment adherence to improve medication adherence in college students with chronic illness.

Present study participants identified having a wide variety of both medical and psychological illnesses. The inclusion criteria on the flyer and email listed that participants must have a chronic illness; typically, “chronic illness” refers to physical health conditions, but students with psychological illness also identified with this description and participated in the survey. The distribution of medical and psychological illnesses in the present study reflects that of previous studies. Oswalt et al. (2018) looked at 454,029 college students’ mental health diagnoses from 2009 to 2015 and found a very similar distribution for psychological illnesses.

The levels of anxiety symptoms and social stigma were higher in the participants with psychological illnesses than those with medical illnesses, but there were no subgroup differences for peer support. Because almost half (47.5%) of the participants with a psychological illness reported a diagnosis of anxiety, this would explain the higher anxiety symptoms in the psychological illness subgroup. The higher social stigma scores among those with psychological disorders likely reflects the stigma around mental health diagnosis. Specifically, mental illness is a concealable stigma because it is not readily visible to others (Quinn & Chaudoir, 2009). Thus, college students may encounter challenges as they decide whether and to whom to...

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**Table 4**

Comparisons of Mean Scores for Constructs of Interests for Medical Illness and Psychological Illness Subgroups

<table>
<thead>
<tr>
<th>Construct</th>
<th>Medical Illness (n=43)</th>
<th>Psychological Illness (n=36)</th>
<th>t</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barriers to medication adherence</td>
<td>42.95 (9.30)</td>
<td>46.53 (13.33)</td>
<td>−1.40</td>
<td>0.31</td>
</tr>
<tr>
<td>Anxiety</td>
<td>44.95 (11.40)</td>
<td>51.61 (9.57)</td>
<td>−2.78**</td>
<td>0.63</td>
</tr>
<tr>
<td>Peer support</td>
<td>5.89 (1.04)</td>
<td>5.57 (1.09)</td>
<td>1.35</td>
<td>0.30</td>
</tr>
<tr>
<td>Social stigma</td>
<td>15.58 (5.70)</td>
<td>19.75 (5.86)</td>
<td>−3.20**</td>
<td>0.75</td>
</tr>
</tbody>
</table>

*Note: † p < .05, ‡ p < .01, *** p < .001.*
disclose their diagnosis and whether they will be rejected or stigmatized for doing so.

Limitations
Although this study had many strengths, including the variety of both medical and psychological chronic illnesses that participants reported, there are also some limitations. This study did not incorporate a medical chart review, so there was no way to confirm that the participants had the chronic illness that they said they did. However, recruitment was done in settings where undergraduate students diagnosed with a chronic illness might receive services (e.g., the medical center and the Office of Disability Services), which might have increased the likelihood that participants did have a chronic illness. This study design was correlational, which means that no conclusions about causality can be made. The sample was predominantly women from one university located in the Midwestern United States. Thus, caution is warranted in generalizing the findings to other female or male students at the same or different universities, and additional research is needed with more diverse populations.

Future Directions
There are several directions for future research. Although the present study examined barriers to medication adherence, a future study should assess medication adherence directly and examine associations with the three constructs of interest. Additionally, anxiety, peer support, and social stigma are all areas that physicians and psychologists can address, and interventions can be developed to reduce barriers to medication adherence and possibly improve treatment regimen adherence. Other factors also likely determine how much college students with chronic illness adhere to their treatment regimen, such as grit, illness uncertainty, resilience, and illness intrusiveness (Sharkey et al., 2017).

This study supplements the existing body of research by documenting aspects of physical and psychological functioning among undergraduates with chronic illness. The results can inform university administrators on the needs of students throughout their college career. This study shows how advances in medical care have allowed students with chronic medical and psychological illnesses to attend and succeed in college (Lipson et al., 2019; Ravert et al., 2017). This study is also informative because it shows that an increasing number of people diagnosed with a psychological illness identify as having a chronic illness. The findings of this study are beneficial because they reveal that there are associations between barriers to medication adherence and anxiety, peer support, and social stigma; these three constructs then are potential avenues to target awareness and interventions to increase medication adherence in this population and ultimately to improve illness outcomes.

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Author Note. Astrida S. Kaugars

This manuscript is dedicated to the memory of Christina Curtis, the lead author, who passed away in July 2020. Christina completed the research design, data collection, data analysis, and a draft of this article for her Honors in Psychology independent research project. She was a hardworking, motivated, and curious student, who is greatly missed by many.

We have no known conflicts of interest to disclose. A poster summarizing the results of this study was presented at Marquette University’s 3rd Annual Undergraduate Psychology Research Symposium in May 2020 and at the Wisconsin Psychological Association’s Student Poster Session in October 2020.

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