




## Miniature Horses Have Big Advantages: Improved Stress, Mood for Both Airport Travelers and College Students

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**ABSTRACT.** The current research expanded the field of animal-assisted therapy by utilizing miniature therapy horses for the first time in research. We sought to determine if and how animal-assisted therapy with miniature horses affected positive mood, negative mood, and stress levels in 2 distinct populations: (a) airplane travelers at an international airport and (b) residential and commuter college students at a Midwestern university. In a repeated-measures design, a convenience sample consisting of 67 individuals and diverse in gender and ethnicity (17 airport travelers, 50 college students) was given a pretest survey, interacted with the horses as long as they wanted, and completed a follow-up survey. Participants showed decreases in negative mood ( $d = .41, p < .001$ ), decreases in current stress ( $d = .93, p < .001$ ), and increases in positive mood ( $d = .26, p = .003$ ), without indicating changes in our manipulation check, general stress level ( $d = .14, p = .36$ ). The findings suggest temporary benefits of interactions with the miniature horses for two very distinct populations.

*Keywords:* animal-assisted therapy, miniature horses, airport travelers, college students, mood.

**S**tress has become commonplace in modern society and has been a major topic of discussion in recent years. Although stress is necessary for survival and is a natural response to even favorable situations, the unfortunate reality for the millions of people who suffer from stress is that it can also have negative consequences on mental and physical health if not managed properly. Adults who report high stress are more likely to suffer from heart diseases or even to succumb to chronic cardiac conditions such as strokes (Davidson, Alcántara, & Miller, 2018; Huang et al., 2015; Wargo, 2007). Although stress issues are prevalent worldwide, the United States of America tends to rate in the top 10 in the world on stress compared to other nations; for American adults in particular, overall rates of stress increased in 2018, with young adults ages

15–49 reporting higher rates of stress, worry, and anxiety than older adults (Ray, 2019). The American Psychological Association's (2018) 12th Annual *Stress in America* survey of 3,458 respondents indicated that work, money/debt, sexual harassment, and gun violence are frequent stress concerns for Americans, especially among Generation Z respondents. Currently America's youngest adults, Generation Z respondents are the least likely of adult subgroups to say that their mental health is good, yet they are also the most likely group of adults to seek professional help. Given that the detrimental effects of stress are widely documented, the current study investigated the use of miniature horses as a way to reduce stress and increase mood for two distinct populations who frequently report stress: airport travelers and college students.

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### Airport Travelers and Stress

Despite the luxuries and resources that Americans are afforded compared to other nonindustrialized nations, they often face stress issues at disproportionate rates. With modern life comes advancement, and such growth can bring new challenges. Inventions and discoveries such as the Internet have many benefits but have also created their own unique problems. One such innovation is air travel. Whether for leisure or work, air travel is a widely viable and occasionally mandatory means to reaching desired destinations. When airplanes were first commercialized, air travel could be hazardous because many of the safety precautions travelers have today were not established. Even as safety has increased, fear of flying (*aviophobia*) often remains for many travelers (van Almen & van Gerwen, 2013). Although not all apprehensive flyers meet the criteria for a specific phobia, nearly 10%–40% of the general population in industrialized countries have a fear of flying, and about 20% of the flying population have continuous or mild apprehension about flying but fly anyway (Gerwen, Spinhoven, Dyck, & Diekstra, 1999). After the destruction of the Twin Towers in New York on September 11, 2001, Americans became particularly apprehensive about traveling on planes (Marshall et al., 2007). As a result of 9/11, airport security intensified to reduce the chances of another attack. Despite these efforts, because terrorist attacks have persisted globally, the stress and fear around flying remains pervasive for many individuals worldwide (Weiss et al., 2016).

Many factors can contribute to stress in regard to air travel, including being away from home, phobias of airplanes or airports, traveling for work, and anxiety disorders (Bricker, 2005). The environment on airplanes also adds potential stressors because passengers are seated in cramped spaces with strangers for a prolonged period of time, miles above the ground. Bricker (2010) indicated that there are two main groups of flyers with the most stress: anxious or distrustful. Anxious flyers are afraid to board the planes, and distrustful flyers are wary about their security on the flight. In fact, it was found that increased security measures can intensify the apprehension that flyers have toward airports and airplanes. With these explanations, it is clear why flight-specific stress is such a problem. Without ways to combat the impending stress or anxiety, such issues will continue to impact many current and future airline travelers.

### Stress and College Students

Airport travelers are clearly not the only individuals for whom stress can be a problem. For many if not most undergraduate and graduate students, the college years are a period of growth that includes high levels of freedom and responsibility but also social pressure and strain. In the process of discovering and defining who they want to be as adults (Bistricky et al., 2018), college students in particular face a wide variety of stressors on interpersonal, intrapersonal, academic, environmental, and financial fronts (e.g., Pierceall & Keim, 2007; Ross, Niebling, & Heckert, 1999; Tran, Mintert, Llamas, & Lam, 2018). College students' stress levels can ebb and flow with the academic year, tending to peak around final exam times in December (Barker, Howard, Villemaire-Krajden, & Galambos, 2018). The stressors that college students face are so significant, in fact, that their mental health has been declared a global public health issue due to the disproportionate number of mental health problems they experience (Stallman, 2010). Clearly, university students are another population that can continue to benefit from effective stress-reduction programs.

### Helping Adults Cope With Stress: Animal-Assisted Therapy

Many adults encounter stress in day-to-day living and therefore turn to some form of self-help or structured therapy for assistance. Behavioral approaches including virtual reality therapy are widely used with aviophobia (see Côté & Bouchard, 2008, for a review). Both short-term and long-term options have been shown to be effective for helping undergraduate and graduate students deal with stress and related disorders (Huang, Nigatu, Smail-Crevier, Zhang, & Wang, 2018; Yusuf, Nicoloso-SantaBarbera, Grey, Moyer, & Lobel, 2018). Some effective therapies for stress in general and psychological disorders specifically have employed the assistance of a variety of animals (Ein, Li, & Vickers, 2018). Many different populations interact with therapy animals including children, adolescents, adults, and older adults, people with physical ailments, people needing speech therapy, people with psychological disorders, and people with developmental disabilities (Boyer & Mundschenk, 2014; Braun, Stangler, Narveson, & Pettingell, 2009; Fedor, 2018; Matuszek, 2010; Nimer & Lundahl, 2007). *Animal-assisted therapy* has been incorporated with everything from cats (De Kok, 2004) to dogs (Arnold, 1995; Elmaci

& Cevizci, 2015; Zafra-Tanaka, Pacheco-Barrios, Tellez, & Taype-Rondan, 2019) to even dolphins (Nathanson & de Faria, 2015). The therapy is adjusted depending on the intended population or the people's needs (Bokkers, 2006). The intended use of animals in animal-assisted therapy is to aid the handler in providing compassion and stimulation for the patients or targets (O'Callaghan & Chandler, 2011). Previous research has found that an hour of interaction with trained therapy dogs reduces stress, anxiety, and blood pressure in college students more effectively than an hour of quiet reading (Muckle & Lasikiewicz, 2017; Nepps, Stewart, & Bruckno, 2014). These findings were supported by a study conducted by Stewart, Dispenza, Parker, Chang, and Cunnien (2014), who found that anxiety in their participant group of college students decreased after spending up to two hours with trained therapy dogs. Indeed, pet therapy events tend to draw crowds on college campuses (Adamle, Riley, & Carson, 2009) and can be an efficient way to help college students temporarily reduce stress (e.g., Crossman & Kazdin, 2015).

Although dogs are perhaps the most commonly deployed animal-assisted therapy animal, farm animals are not outside the scope of possibility. Berget, Ekeberg, and Braastad (2008) observed the interactions between farm animals and psychiatric patients. They determined that interaction with farm animals was able to help patients improve self-efficacy and coping abilities. Goats have increased quality of life for individuals with disabilities (Scholl et al., 2008). *Equine-assisted (horse) therapy* is an especially noteworthy farm animal species for animal-assisted therapy. Equine-assisted therapy has been in practice for hundreds of years; doctors in the 1800s prescribed horseback riding to help with depression and other ailments (McConnell, 2010). Horses are reported to be emotionally sensitive animals, which facilitates bonding and serves many functions for those suffering from psychological problems (Dunlop & Tsantefski, 2018; Johansen, Arfwedson Wang, Bind, & Malt, 2014). Particular beneficial tasks can be done with therapy horses. Reportedly, grooming or petting these therapy horses promotes bonding between horses and human targets, which can be comforting to humans (McConnell, 2010). In addition, therapeutic riding with horses (sometimes called *hippotherapy*) has been seen to have positive effects on emotional health, such as the improvement of self-esteem and self-efficacy (Bizub, Joy, & Davidson, 2003). However, there are also significant drawbacks to utilizing equine

therapy. For example, a sizable portion of people are afraid of horses due to their size. Also, because of their size, traditional-size horses are also usually only accessible at farms. Patients may not be able to consistently travel long distances to visit these horses for therapy. Some patients also may not be able to ride therapy horses due to certain physical disabilities, which can limit their treatment options. Miniature horses—which are different and smaller than ponies, defined by their height of under 38 inches at the last hairs of the manes (American Shetland Pony Club, 2019)—cannot be ridden by people, but they may provide a more physically and emotionally accessible form of interactive equine therapy than standard-sized horses.

### **The Current Study: Miniature Horses Have Big Advantages?**

To the best of our knowledge, studies have not evaluated the potential effectiveness of miniature horses as therapy animals, despite the fact that they share the emotionally sensitive qualities that regular horses are known to have. In addition, miniature horses' smaller stature means they can travel into areas such as airports and college campuses with less risk of injury and more convenience in order to provide mental, emotional, and physical benefits to both children and adults in various locations. Based on prior research regarding animal-assisted therapy and equine therapy specifically, we hypothesized that interaction with the miniature horses would result in an increase in reported positive affect and a decrease in reported negative affect. We also hypothesized that, after interacting with the miniature horses, participants would report a decrease in their stress levels in the moment but would not indicate changes with stress in general.

## **Method**

### **Participants**

For the airport travelers, we recruited a convenience sample of 22 participants visiting an international airport in the Midwestern United States. For the individuals who filled out the survey both before and after interacting with the miniature horses ( $n = 17$ ), participants ranged in age from 18 to 77 years old, with a mean age of 41.35 years ( $SD_{age} = 16.33$ ; female = 10). The airport location allowed for some variation by ethnic group, with 1 African-American, 3 Hispanics/Latinx, 1 Native American, 10 White Americans, 1 person that identified as "other," and 1 who did not indicate ethnicity. Typical annual household income for participants ranged from

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\$20,000 to \$300,000, with a mean of \$117,500 ( $SD_{\text{income}} = \$85,073$ ), and a median of \$100,000.

Participants from the college sample included 100 college students at a Midwestern public doctoral institution (64 female students, 33 male students, 2 did not report gender). The data was collected from three visits by miniature horses at two campuses: a main, residential campus ( $n = 37$ ) and a regional, commuter campus ( $n = 63$ ). Faculty, staff, and students over the age of 18 were eligible for participation ( $M_{\text{age}} = 22.76$ ,  $SD_{\text{age}} = 9.64$ ); however, only student data are included and reported here. The sample was primarily White American (69), but consistent with campus demographics, also included people from a variety of ethnic backgrounds: Chinese (4), African American (2), Hispanic (2), Japanese (1), and Biracial/Other (12), with 10 individuals not identifying ethnicity. Participants had grown up in an array of geographical locations: Urban/city (25), suburbs (44), and rural/small town (25). Family income ranged between \$0 and \$200,000 ( $M_{\text{income}} = \$55,304$ ,  $SD_{\text{income}} = \$54,335$ ,  $Mdn_{\text{income}} = \$50,000$ ). A subsample of 50 college students provided identification numbers that allowed us to compare their pre-post results. No compensation or benefits apart from getting to interact with the miniature horses were provided to any participants.

### Materials

**Mood measures.** The preinteraction, paper-based survey included a list of 20 items regarding current pleasant and unpleasant emotions from the widely used Positive and Negative Affect Schedule (Watson et al., 1988). Responses are divided into two, independent subscales: Positive Affect and Negative Affect. The positive affect score was found by adding the positive adjectives (interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active). The negative affect score was found by adding the negative mood adjectives (distressed, upset, guilty, scared, hostile, ashamed, nervous, jittery, irritable, and afraid). Each of the questions were answered on a 5-point Likert-type scale from 1 (*do not feel that particular mood adjective currently*) to 5 (*definitely feel that adjective currently*). Therefore, larger scores showed more pleasant and more negative current mood, respectively. The measure is widely used, with strong reliability and validity indicators in other studies. In the current study, the subscales were also sufficiently reliable for both positive affect ( $\alpha = .89$ ) and negative affect ( $\alpha = .87$ ).

**Stress measures.** On one item, participants rated their stress at the moment from 1 (*not at all stressed*) to 10 (*extremely stressed*). On a second item, they rated their stress in general on the same scale from 1 (*not at all stressed*) to 10 (*extremely stressed*). Therefore, higher scores indicated greater stress levels.

**Demographic items.** Ethnicity, age, gender, student status (where applicable), and geographic area growing up (urban/city, suburbs, rural/small town) were included to describe the samples. In addition to demographic questions, we also inquired "How many animals do you currently have/have you owned in the past?" (open-ended).

**Other measures.** On the postinteraction survey, participants were asked with open-ended questions whether their stress and mood levels had changed. If they indicated yes, we asked them to describe why they thought their state had changed. We asked whether or not they enjoyed interacting with the horses and why. "How much of an animal lover are you?" was rated by participants on a scale from 1 (*not at all*) to 10 (*huge animal lover*).

### Design

The study utilized a 2 (time: pretest and posttest) x 4 (type of outcome measure: positive affect, negative affect, current stress, stress in general) x 3 (location: main campus, commuter campus, airport) mixed design. Mood/stress served as the dependent variable. Location served as a between-subjects factor, and time and measure type were within-subjects factors.

### Procedure

After receiving approval for the project from the Institutional Review Board, we secured miniature horses in partnership with a therapeutic miniature horse farm in Southwest Ohio. With therapy being the nonprofit's primary goal, the farm provides trained miniature horses and handlers that travel to different locations in order to provide mental, emotional, and physical benefits to both children and adults. People have the ability to interact with the miniature horses for as long as they like, while trained handlers hold onto the miniature horses and supervise the interaction. The organization often visits the airport, assisted living homes, universities, and a variety of other locations. This nonprofit organization has received a lot of media coverage because it is rare to see miniature horses in facilities such as the ones they visit. They have been featured by local media news stations, radio

stations, magazines, journals, and Internet blogs, and have even been featured by NPR, NBC News, and USA Today (Baskas, 2016; Steigerwald, 2017; Thompson, 2017). This organization was a strong and reputable partner for this study because they already service a variety of locations and had the resources required to provide for the animals' care and transportation.

Because the first author of the research was also employed by the horse farm at the time of the study, she helped handle the horses at the campus events but did not collect data or speak to participants except to answer questions about the horses themselves, so as to minimize potential researcher bias in the data outcomes. As potential participants approached the horses, the research team (minus the first author) informed participants that they were welcome to interact with the horses and that, additionally, there was a study being conducted involving the horses. Because the times with the horses were already events scheduled by the hosting location, individuals could decline the research study and still spend time with the horses. If they agreed to participate in the study, participants (age 18 and older only) provided informed consent and completed the pretest survey, which included demographic information, mood, and stress items. All of the participants were asked to write down a personalized code for the purposes of matching their surveys from Time 1 to Time 2. Some participants only wanted to take pictures with the miniature horses, while others wanted to pet and sit with the miniature horses for up to 20 minutes. After the interaction with the miniature horses, participants completed the posttest survey, which included mood and stress items again and the follow-up questions (see "Other measures"). After the two surveys were completed, researchers provided the participants debriefing and contact information for their records.

## Results

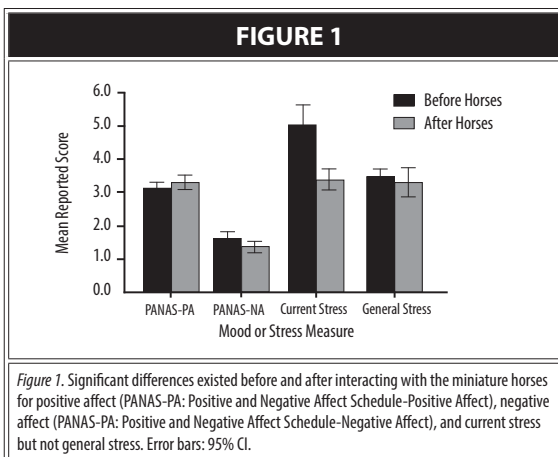
Please see Table 1 for descriptive statistics. We hypothesized that, for all three locations (airport, regional campus, main campus), participants' interaction with the horses would increase positive affect, decrease negative affect, and decrease current stress but not general stress. To test our hypothesis, we ran a mixed-model, 2 (time; within) x 4 (stress/mood measure; within) x 3 (location; between) Multivariate Analysis of Variance. A significant main effect existed for time,  $F(1, 57) = 49.54, p < .001, \eta^2_p = .47$ , and outcome measure,  $F(3, 55) = 190.58,$

$p < .001, \eta^2_p = .91$ , with a significant interaction for Time x Outcome,  $F(3, 55) = 20.12, p < .001, \eta^2_p = .52$ . With no significant effects for location,  $F(2, 57) = 0.52, p = .60, \eta^2_p = .02$ , or interactions with location, location was subsequently dropped from the model. Given the main effect for time and interaction with measure, a series of follow-up, paired-sample  $t$  tests were conducted (see Figure 1).

As hypothesized, positive mood increased significantly from preinteraction positive mood score to postinteraction positive mood score,  $t(66) = -3.12, p = .003, d = .26$ ; negative mood decreased significantly from preinteraction to post interaction,  $t(66) = 4.45, p < .001, d = .41$ ; and self-reported current stress decreased significantly from preinteraction to postinteraction current stress,  $t(66) = 6.71, p < .001, d = .93$ . Also as hypothesized, there was no significant change in scores for self-reported

Variables	Commuter Campus <i>M (SD)</i>	Residential Campus <i>M (SD)</i>	Airport <i>M (SD)</i>	Total <i>M (SD)</i>
<b>Pretest</b>				
PANAS-PA	3.13 (0.78)	2.85 (0.77)	3.38 (0.38)	3.12 (0.71)
PANAS-NA	1.81 (0.95)	1.56 (0.55)	1.33 (0.31)	1.62 (0.74)
Current Stress	5.21 (2.44)	5.00 (2.16)	4.81 (1.94)	5.05 (2.21)
General Stress	3.54 (0.79)	3.50 (0.73)	3.38 (0.81)	3.48 (0.77)
<b>Posttest</b>				
PANAS-PA	3.18 (0.91)	3.24 (0.73)	3.64 (0.61)	3.32 (0.80)
PANAS-NA	1.57 (0.77)	1.23 (0.40)	1.08 (0.13)	1.36 (0.60)
Current Stress	3.46 (0.92)	3.56 (1.67)	3.06 (1.82)	3.38 (1.22)
General Stress	3.43 (2.01)	3.31 (0.60)	3.06 (1.57)	3.30 (1.66)

*Note.* PANAS-PA = Positive and Negative Affect Schedule, positive affect. PANAS-NA = Positive and Negative Affect Schedule, negative affect.



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general stress from Time 1 to Time 2,  $t(59) = 0.93$ ,  $p = .36$ ,  $d = .14$ . Given that significant skew existed in the negative affect data and that stress variables were ordinal, we additionally ran Wilcoxon signed ranks tests as a more sensitive, nonparametric equivalent ( $n = 67$ ), which were similarly significant for positive affect,  $z = -3.37$ ,  $p = .001$ ,  $d = .29$ ; negative affect,  $z = 4.76$ ,  $p < .001$ ,  $d = .41$ ; and current stress,  $z = 5.46$ ,  $p < .001$ ,  $d = .47$ ; but not general stress,  $z = 1.09$ ,  $p = .28$ ,  $d = .09$ .

### Supplementary Analyses (Qualitative Themes)

Almost without exception, participants stated in their postsurveys that they enjoyed their interactions with the miniature horses and found their interactions beneficial for several key reasons. The experience enabled participants to forget about their troubles momentarily; for example, one college student stated that the horses “distracted me from my great-grandmother’s death yesterday.” Another common response was it being a pleasant surprise to see the animals because they are rarely seen at locations such as airports and college campuses. Participants most frequently stated that the horses were comforting because they were “soft and cute” and that petting the horses made participants “feel calm and more centered.” The themes from the qualitative responses were similar for both airport travelers and college students.

### Discussion

As hypothesized, the results suggested that miniature therapy horses provided a significant reduction in negative affect, a significant increase in positive affect, and a significant reduction in reported stress in the moment (but not in general). These results further provide supporting evidence that miniature horses can be used for animal-assisted therapy both to help reduce stress levels in travelers in airport settings and to help students in college settings. The pattern of results suggested that similar benefits for miniature horses exist as found in other animal-assisted therapy studies (e.g., Banks & Banks, 2002; Nordgren & Engström, 2013). One reason for this finding could be because people create a special bond with animals because of the animals’ ability to connect with humans (Willens, 2013). Participants also noted aspects like being animal lovers or the animals’ cuteness as reasons why their stress and mood improved.

Due to the distinctions of our two samples in two very different applied settings, the external validity of our findings increases. We collected

data three times at the airport, once at a regional (commuter) campus and twice at the main campus, which adds to the geographic and socioeconomic diversity of our samples. Admittedly, however, sampling at one airport and one university in the Midwest does not necessarily make our findings widely generalizable. Given this was a pilot study, the sample was also a small, self-selected, convenience sample for pre-existing events scheduled by the horse farm and hosting institutions. Creating a more structured experimental design could help increase internal validity, and repeated visits with the horses might answer questions about whether the beneficial effects of interaction with the miniature horses have more than a temporary effect.

Regarding additional limitations, even with the diversity in the sample, mainly White women chose to participate. Although people from a variety of gender and ethnic backgrounds were represented, considering the small sample size, higher proportions of men and participants in more ethnic groups would lead to greater generalizability for this study. The possibility of self-selection bias also exists due to the convenience sampling that took place: People were not randomly assigned but chose whether or not to interact with the horses, and many people that decided to interact with the horses did not choose to participate in the survey. Time was also a limitation in our study in two ways. First, some potential respondents did not have time to interact with the miniature horses or do the survey because they needed to reach their respective departure gates (airport) or campus obligations (college students). Second, because we were working in a real-world setting, the time participants spent interacting with the horses was not controlled but was self-determined, which might be a confounding variable. In the future, permission to gain access past the airport security could allow some people to be close to their departure gate while interacting with the miniature horses. Additionally, future studies could create timed interactions where each participant is interacting with the horses for a specific length of time in order to see if length of time would affect the data.

Finally, given that this was not a double-blind study, it is possible that the results were influenced either by social desirability (participants knowing what the researchers were asking for and therefore attempting to answer accordingly, especially considering the one-item stress measure) or inadvertent experimenter bias and influence. For future research purposes, it may be useful to

evaluate whether repeated exposure to the miniature therapy horses affects stress and mood and to compare the effects of miniature horses to other therapy animals, as well as include a larger, more diverse sample. It would also be beneficial to use a more rigid blind or double-blind experimental design so that potential changes in mood and stress could be compared to a control group or groups (e.g., saw but did not interact with the horses, pet a stuffed horse instead of a live one, looked at pictures of horses, imagined petting horses rather than petting horses in vivo). Lastly, future research with miniature horses should expand to new target locations, including senior centers and preschools, as well as other populations like individuals with autism, intellectual or developmental disabilities, cerebral palsy, or even behavior disorders (e.g., Feltman, 2019; Johansen, Arhwedson Wang, & Binder; 2016; McDaniel Peters & Wood, 2017).

## Conclusion

Despite the study's limitations, this research was the first to show that, even if the effects might be short-lived, miniature horses have potential to help reduce negative mood, increase positive mood, and reduce stress for both airport travelers and college students, two distinct populations who share a tendency to report high stress levels. Personnel at airports and colleges—or even other kinds of organizations—could benefit from this study by utilizing miniature horses to positively impact the quality of life for their constituents.




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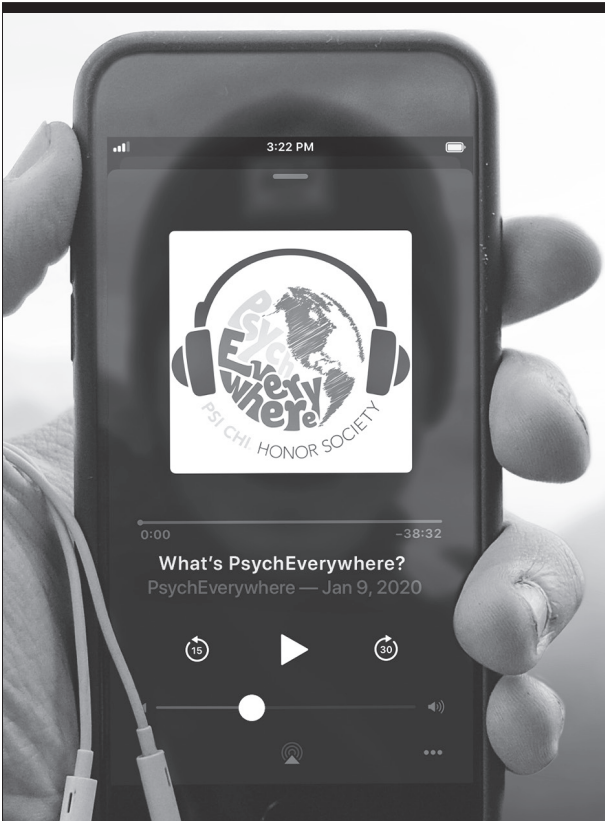
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