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The impacts of a nature-based mentorship program on students' self-regulation:

Harnessing the anticipation effect

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Abstract

Self-regulation is essential to youths' long-term mental well-being and healthy functioning and positive anticipation of future events may support healthy emotional regulation. Green Chimneys, a school in New York that serves students with special education needs and psychosocial challenges, offers its students weekly one-on-one nature-based mentoring sessions with school staff. We used a modified version of the State Difficulties in Emotion Regulation Scale (S-DERS) to explore how these sessions impacted students' emotional regulation both before and after their sessions. Results indicated that students' behavior may improve in the 1-4 hours prior to participation. Further research is needed to test these findings.

Keywords: animal-assisted intervention, human-animal-environment interaction, self-regulation, special education, residential treatment

Introduction

Although most research on psychological well-being has focused on responses to events happening in the past or the present moment, the anticipation of future events is increasingly recognized as an important area of research (Luo et al., 2018). How people mentally construct their futures is key to shaping their perceptions, thoughts, affects, memories, motivations, and behaviors in the present moment (Grupe et al., 2013; Seligman et al., 2013). Excessive negative anticipation of future events has been found to contribute to disorders including depression, anxiety, and post-traumatic stress disorder (PTSD; Abler et al., 2007; Aupperle et al., 2012; Nitschke et al., 2009). In contrast, positive anticipation of future events is associated with greater psychological well-being, a more positive affect, and more positive emotions after a social stressor (Macleod and Conway, 2005; Montfort et al., 2015).

A recent study found that anticipation of positive, as compared to neutral, future events was associated with activation of the bilateral medial prefrontal cortex (MPFC), which is involved in emotion regulation (Luo et al., 2018). Specifically, the MPFC is thought to modulate activity in regions of the brain associated with emotional reactivity including the amygdala, insula, and periaqueductal gray (Etkin et al., 2015). This finding supports the theory that anticipation of future events may be associated with emotional self-regulation, which is itself a key component of psychological well-being (Luo et al., 2018).

Adolescents' development of self-regulation skills has long-term impacts on their mental health and well-being (Beauchaine & McNulty, 2013; Eisenberg et al., 2010; Quinn & Fromme, 2010). Struggles with self-regulation can limit youths' abilities to function successfully in the classroom and broader society, while strong self-regulation skills can help them manage distress,

conflict, and emotional arousal and lead them to engage in fewer high-risk behaviors (Gestsdóttir & Lerner, 2007; Gestsdóttir et al., 2010; Nigg, 2017).

Green Chimneys, an approved New York State 853 private school for special education and mental health treatment, serves approximately 250 students with special education needs and psychosocial challenges, including emotional disturbances, learning disabilities, autism spectrum disorders, multiple disabilities, and mental health challenges (Morris et al., 2019). Youth enrolled at Green Chimneys have been unsuccessful in other, less structured, school settings due to self-regulation difficulties that hindered their academic performance and ability to engage in positive social interactions (Flynn et al., 2019b).

In addition to traditional mental health treatment and special education, Green Chimneys provides a wide variety of nature-based interventions through its equine, farm animal, horticulture, wildlife and canine programs, known collectively as "the farm" (Morris et al., 2019). Initial research has indicated that these programs may support students' self-regulation abilities as measured by the number of physical restraints performed, which were more than a hundred times more common in classroom settings than nature-based settings (Flynn et al., 2019a). Qualitative interviews with Green Chimneys therapists also found that time youth spent on the farm was associated with improved self-regulation (Flynn et al., 2020b). Most recently, behavioral observation analysis of Green Chimneys students within their classrooms revealed that their self-regulation may improve just prior to leaving the classroom to spend time as a class on the farm (Geldhof et al., 2021). This is hypothesized to be related to students' positive anticipation of those activities.

Through the school's Learn and Earn program, students are offered individual, nature-based mentoring sessions that occur weekly and are delivered by farm staff and interns. Based on

preliminary conversations with Green Chimneys staff, this program may be particularly valuable to students' psychological well-being and self-regulation skills. To better understand the impacts of Learn and Earns on students' self-regulation before and after their sessions, the Institute for Human-Animal Connection (IHAC) Research team conducted a two-year study of the Learn and Earn program.

Methods

Green Chimneys interns and farm staff used the validated State Difficulties in Emotion Regulation Scale (S-DERS; Lavender et al., 2015). The original S-DERS scale consisted of 21 items across four factors: "nonacceptance of current emotions (nonacceptance)" (e.g., "I feel guilty for feeling this way"), "limited ability to modulate current emotional and behavioral responses (modulate)" (e.g., "My emotions feel out of control"), "lack of awareness of current emotions (awareness)" (e.g., "I am paying attention to how I feel"), and "lack of clarity about current emotions (clarity)" (e.g., "I have no idea how I am feeling"; Lavender et al., 2015, p. 204). Responses to the S-DERS have been shown to be significantly associated with emotional reactivity and the ability to modulate negative emotions (Lavender et al., 2015). This study used four of the seven questions within the "modulate" subscale, which had strong correlations with other measures of emotional reactivity and avoidance of unwanted emotions (Lavender et al., 2015). This initial version, which consisted of four 3-point Likert-scale questions (such as "I feel overwhelmed by my emotions right now"), was administered before and after every Learn and Earn session for every student who assented and whose guardians consented to their participation, according to the University of Denver's Institutional Review Board protocol (1324118-2). This version of S-DERS was administered from October 1, 2018-February 8, 2019. However, based on ongoing feedback from staff, it was determined that most students were not

responding to the survey accurately and instead rushed through the questions, often giving the same answer every day for every question, so that their Learn and Earns could begin without delay. Therefore, those data were not included for analysis and a further modification of S-DERS was implemented as an observer report of students' momentary self-regulation at the beginning and end of each Learn and Earn session. This version had questions such as "The student seems to feel overwhelmed by their emotions right now" and was employed for the remainder of the study, from February 25, 2019-March 9, 2020, at which time the study ended due to disruptions related to the COVID-19 pandemic.

In total, 2,710 pre/post surveys were completed by staff for 246 students of participation in Learn and Earns. Staff facilitated Learn and Earns with their students for at least 4 months prior to completing observer reports and therefore had familiarity students' baseline states and its presentation for each student for whom they completed the modified S-DERS survey.

Findings

The Likert-scale responses were converted to points, with "not at all" (the response indicating the highest level of self-regulation) earning 3 points, "some" earning 2 points, and "a lot" earning 1 point. Initial analysis revealed very little change in students' self-regulation levels at the end of Learn and Earn sessions, with an average improvement of only 0.19 points out of 12. One possible interpretation of the limited changes in scores was the occurrence of a ceiling effect, as students were assessed as being well-regulated at the beginning of their Learn and Earn for the majority of sessions, averaging 11.49 points out of 12 immediately before their sessions (Table 1). Because of these high initial scores, there was little room for improvement through S-DERS by the end of their session. This finding aligned with prior studies conducted by the research team and anecdotal reports from Green Chimneys teachers and staff, who frequently

described students' behavior noticeably improving during the time immediately preceding

participation in nature-based interventions and in anticipation of Learn and Earns (Flynn et al.,

2020b).

Table 1.

Average S-DERS scores when pre-test was conducted immediately before the Learn and Earn

session.

Survey item	Difficulty doing things	Difficulty controlling behaviors	Overwhelmed by emotions	Difficulty controlling emotions	Total
Pre-test	2.84	2.87	2.88	2.91	11.49
Post-test	2.91	2.93	2.95	2.92	11.68
Change	0.07	0.06	0.07	0.01	0.19

To test the hypothesis that students' behavior improved prior to attending Learn and

Earns in anticipation of spending time with the farm staff person and/or animals and nature, the

research team focused a second round of analysis on assessing the self-regulation behaviors of a

subset of students between one and four hours before their Learn and Earn sessions, rather than

immediately prior. This subset of the full sample consisted of 21 6th grade students whose

classroom behavior was recorded while in their homeroom class via secure video and file storage

system. 111 videos of these students were recorded and a research assistant, with training and

prior experience in behavioral observation analysis using videos was trained to apply the S-

DERS scale based on observations from 5-minute video clips. These S-DERS scores were

compared to the scores of surveys administered in-person by Green Chimneys staff at the end of the students' Learn and Earn sessions.

Whereas the average change in students' self-regulation was only 0.05 points for each survey question when the pre-test was completed at the beginning of the Learn and Earn session, when the pre-test was based on classroom behavior at a time not immediately preceding the individual's Learn and Earn session, the average change for each item was 0.39 points. Similarly, the total average change increased nearly tenfold, from 0.19 to 1.60 out of 12 points (see Table 2 below for further details).

Table 2.

Average changes in S-DERS scores when pre-test was calculated 1 to 4 hours before the Learn and Earn session.

Survey item	Difficulty doing things	Difficulty controlling behaviors	Overwhelmed by emotions	Emotions difficult to control	Total
Pre-test	2.41	2.49	2.65	2.67	10.18
Post-test score	2.92	2.96	2.96	2.95	11.78
Change	0.51	0.47	0.31	0.28	1.60

Implications

Interventions like the Learn and Earns, with which students appeared to hold positive associations, may begin having a positive impact on students' behavior before the sessions begin due to students' positive anticipation of these sessions. These findings align with other research

that has been conducted at Green Chimneys, which has similarly found that students' classroom behavior may improve in anticipation of animal-assisted interventions (Geldhof et al., 2021). The magnitude of the potential positive impacts of nature-based programs like Learn and Earns on self-regulation is further supported by other research completed by the research team at Green Chimneys, which found that dysregulation severe enough to warrant physical restraint was more common in classrooms and non-nature-based settings and that severe dysregulation was rare in nature-based contexts such as the Learn and Earns (Flynn et al., 2019a).

Limitations

This program evaluation was limited in several ways. In the initial analysis, students' evaluations were based on farm staff or intern observations, which may not always reflect students' internal states. Further, while each student was typically assessed by the same staff member each week, different students had different staff members assess them, staff may have applied the tool differently, and there was not sufficient data to test inter-rater reliability. Similarly, in the follow-up analysis, a Denver-based research assistant analyzed students' behavior before the Learn and Earn sessions via video observations, and this data was compared to another person's analysis of student behavior in person after the session. Although the Denver-based research assistant was unaware of the study hypothesis, some of the differences in their ratings may be due to differences in the analysts' evaluation styles, familiarity with the students, or the differences between video-based and in-person interactions, rather than in the students' behaviors. The video clips were also only 5 minutes long, which may not have been sufficient to provide an accurate picture of students' momentary states. Furthermore, the video data were not recorded the same amount of time before each Learn and Earn, which allows for a number of confounding variables, including time of day, presence or degree of anticipation

effect, and current and previous classroom activities, to impact results. Finally, for any effect that may have occurred, it is impossible to know what component(s) of the intervention may have driven this phenomenon (e.g., students' relationships with intervention staff, students' relationships with animals, physical activity).

Conclusions

The findings of this study suggest the Learn and Earns may help strengthen self-regulation through an anticipation effect, though caution is needed when considering implications of this evaluation given the noted critical limitations. This finding is consistent with previous qualitative and quantitative studies conducted by the research team at Green Chimneys. This included behavioral observations of students in the classroom, qualitative interview data and anecdotal data from teachers, farm staff, and the students themselves (Flynn et al., 2019a; Flynn et al., 2019b; Flynn et al., 2020a; Flynn et al., 2020b; Morris et al., 2019). Future research should work to address the limitations of the existing results by using validated tools and consistent methods to evaluate students' self-regulation at consistent time frames before and after Learn and Earns.

References

Abler, B., Erk, S., Herwig, U., & Walter, H. (2007). Anticipation of aversive stimuli activates extended amygdala in unipolar depression. *Journal of Psychiatric Research, 41*(6), 511-522. https://doi.org/10.1016/j.jpsychires.2006.07.020

Aupperle, R.L., Allard, C.B., Grimes, E.M., Simmons, A.N., Flagan, T., Behrooznia, M., Cissell, S. H., Twamley, E. W., Thorpe, S. R., Norman, S. B., Paulus, M. P., & Stein, M. B. (2012). Dorsolateral prefrontal cortex activation during emotional anticipation and neuropsychological performance in posttraumatic stress disorder. *Archives of General Psychiatry, 69*(4), 360-371. https://doi.org/10.1001/archgenpsychiatry.2011

Beauchaine, T. P., & McNulty, T. (2013). Comorbidities and continuities as ontogenic processes: Toward a developmental spectrum model of externalizing psychopathology. Development and Psychopathology, 26(2), 1505-1528. https://doi.org/10.1017/S0954579413000746

Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. Annual Review of Clinical Psychology, 6, 495. https://doi.org/10.1146/annurev.clinpsy.121208.131208

Etkin, A., Buchel, C., & Gross, J. J. (2015). The neural bases of emotion regulation. *Nature Reviews: Neuroscience, 16*(11), 693-700. https://doi.org/10.1038/nrn4044

Flynn, E., Denson, E.B., Mueller, M.K., Gandenberger, J., & Morris, K.N. (2020). Human-animal-environment interactions as a context for youth social-emotional health and wellbeing: Practitioners' perspectives on processes of change, implementation, and challenges. *Complementary Therapies in Clinical Practice*, *41*, 101223. https://doi.org/10.1016/j.ctcp.2020.101223

Flynn, E., Gandenberger, J., Mueller, M.K., & Morris, K.N. (2020). Animal-assisted interventions as an adjunct to therapy for youth: Clinician perspectives. *Child and Adolescent Social Work Journal.* https://doi.org/10.1007/s10560-020-00695-z

Flynn, E., Mueller, M. K., Luft, D., Geldhof, G. J., Klee, S., Tedeschi, P., Morris, K. N. (2019). Human-animal-environment interactions and self-regulation in youth with psychosocial challenges: Initial assessment of the Green Chimneys Model. *Human-Animal Interaction Bulletin, 8*(2), 53-65.

Flynn, E., Zoller, A.G., Mueller, M.K., & Morris, K.N. (2019). Human-animal-environment interactions as a context for child and adolescent growth. *Journal of Youth Development, 14*(4), 144-163. https://doi.org/10.5195/jyd.2019.839

Geldhof, G.J., Flynn, E., Olsen, S., Mueller, M.K., Gandenberger, J., Witzel, D., & Morris, K.N. (2021). Emotion regulation as an idiographic process: Modeling the impact of animal-assisted interventions on classroom behavior. *Journal of Applied Developmental Psychology*, *73*(101253).

Gestsdóttir, S., Bowers, E., von Eye, A., Napolitano, C. M., Lerner, R. M. (2010). Intentional self regulation in middle adolescence: The emerging role of loss-based selection in positive youth development. Journal of Youth and Adolescence, 39(7), 764-782. https://doi.org/10.1007/s10964-010-9537-2

Gestsdóttir, S., Lerner, R. M. (2007). Intentional self-regulation and positive youth development in early adolescence: Findings from the 4-H study of youth development. Developmental Psychology, 43(2), 508-521. https://doi.org/10.1037/0012-1649.43.2.508

Grupe, D. W., Oathes, D. J., & Nitschke, J. B. (2013). Dissecting the anticipation of aversion reveals dissociable neural networks. *Cerebral cortex, 23*(8), 1874-1883. https://doi.org/10.1093/cercor/bhs175

Lavender, J. M., Tull, M. T., DiLillo, D., Messman-Moore, T., & Gratz, K. L. (2015) Development and validation of a state-based measure of emotion dysregulation: The State Difficulties in Emotion Regulation Scale (S-DERS). *Assessment, 24*(2), 197-209. https://doi.org/10.1177/1073191115601218

Luo, Y., Chen, X., Qi, S., You, X., & Huang, X. (2018). Well-being and anticipation for future positive events: Evidences from an fMRI study. *Frontiers in Psychology,* 8, 2199. https://doi.org/10.3389/fpsyg.2017.02199

MacLeod, A. K., & Conway, C. (2005). Well-being and the anticipation of future positive experiences: The role of income, social networks, and planning ability. *Cognition & emotion, 19*(3), 357-374. https://doi.org/10.1080/02699930441000247

Monfort, S. S., Stroup, H. E., & Waugh, C. E. (2015). The impact of anticipating positive events on responses to stress. *Journal of Experimental Social Psychology, 58*, 11-22. https://doi.org/10.1016/j.jesp.2014.12.003

Morris, K. N., Flynn, E., Jenkins, M. A., Senecal, J., Gandenberger, J., Hawes, S. M., Tedeschi, P., Mueller, M. K., Klee, S., Kaufmann, M., & Kinoshita, M. (2019). *Documentation of nature-based programs at Green Chimneys*. Denver, CO: University of Denver, Institute for Human-Animal Connection. Available at: http://www.greenchimneys.org/why-animals-nature/sam-myra-ross-institute/tools-resources-practitioners/recent-studiesfindings/

Nigg, J. T. (2017). Annual research review: On the relations among self-regulation, self- control, executive functioning, effortful control, cognitive control, impulsivity, risk-taking, and inhibition for developmental psychopathology. *Journal of Child Psychology and Psychiatry, 58*(4), 361-383.

Nitschke, J. B., Sarinopoulos, I., Oathes, D. J., Johnstone, T., Whalen, P. J., Davidson, R. J., & Kalin, N. H. (2009). Anticipatory activation in the amygdala and anterior cingulate in generalized anxiety disorder and prediction of treatment response. *American Journal of Psychiatry, 166*(3), 302-310. https://doi.org/10.1176/appi.ajp.2008.07101682

Quinn, P. D., & Fromme, K. (2010). Self-regulation as a protective factor against risky drinking and sexual behavior. *Psychology of Addictive Behaviors, 24*(3), 376-385. https://doi.org/10.1037/a0018547

Seligman, M. E., Railton, P., Baumeister, R. F., & Sripada, C. (2013). Navigating into the future or driven by the past. *Perspectives on psychological science, 8*(2), 119-141. https://doi.org/10.1177/1745691612474317