

EFFECTS OF VIRTUAL COLLEGE COURSE ON FLOURISHING

Can the Virtual Implementation of a College Course on Human Flourishing Improve Student Flourishing during COVID-19? A Multi-University Study

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Abstract

Objective. Evaluate student effects of participating in an undergraduate academic course, Art and Science of Human Flourishing, that was offered in a synchronous, virtual format during the Fall 2020 semester at three universities.

Participants. Three combined cohorts of undergraduate students from three universities ($n = 168$).

Methods. A pre/post/5-month follow-up, propensity-score matched evaluation was conducted. Measures assessed attention skills, social-emotional skills, flourishing, depressive symptoms, and sleep quality.

Results. Relative to comparisons, students in the course reported significant improvements in proximal outcomes related to mindfulness, compassion, and common humanity, as well as decreases in depressive symptoms. Improvements in distal outcomes of flourishing and depressive symptoms were significant at post-course but did not maintain significance at five-month follow-up.

Conclusions. The academic study of human flourishing and contemplative education offers a promising and unique approach to supporting undergraduate mental health and well-being, even in virtual settings.

Keywords. Flourishing; holistic education; wellbeing; mindfulness; emerging adulthood.

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In the United States, emerging adulthood is often an important time of life to explore what it means to flourish. As young people grapple with who they are and who they want to become, this time of life is associated with higher stress and uncertainty concerning one's relationships, living circumstances, employment, and finances.¹ The COVID-19 pandemic intensified these stressors for many college students as they grappled with uncertainty around social relationships, fraught living situations, and what the academic disruption would mean for their future goals.² As such, efforts to support college students' mental health and well-being in ways that were systematic and meaningful became a priority for universities around the world.³ One means of providing students support during this period was through an education on flourishing, which we conceptualize as the learning of contemplative skills and perspectives related to conscious awareness, interconnection, and sense of purpose.⁴ In this study, we explore whether a virtual, synchronous course on human flourishing offered during the Fall 2020 semester of the COVID-19 pandemic played a role in cultivating mindfulness and compassion skills in college students and thereby, in promoting their mental health and well-being during a time of global stress and uncertainty.

Effects of COVID-19 Pandemic on Flourishing

Prior to the pandemic, research showed that successive cohorts of college-aged students reported increased loneliness and depression and decreased flourishing each year.^{5,6} When U.S. college campuses closed in March 2020, feelings of stress, uncertainty, and nervousness rose among students as they transitioned to virtual courses.^{7,8,9} One survey of 30,000 university students given in May-July 2020 showed that 35% of students screened positive for major depressive disorder and 39% for generalized anxiety disorder.¹⁰ Worsened mental health was also

related to decreased sleep quality during this time.¹¹ The pandemic also adversely affected skills and perspectives related to student well-being. Students reported less ability to bring focused attention to their academic coursework.⁸

Flourishing Qualities as Protective Factors During the Pandemic

Studies of U.S. college students found that skills of flourishing (i.e., qualities that support psychological and social well-being) served as protective factors during the pandemic. Qualities of mindfulness, compassion, and a sense of meaning and purpose, for instance, helped promote resilience to various pandemic stressors in college students such as a fear of contracting COVID-19.^{12,13,14} Greater trait mindfulness predicted better coping with such stressors, and greater compassion was associated with greater adherence to CDC health guidelines during the pandemic.¹⁵ Smith et al¹⁶ found that college students who had greater mindfulness and viewed the future with a sense of expansiveness reported lower depression, anxiety, and stress during the pandemic. Given the evidence that flourishing skills can be cultivated through training,¹⁷ nurturing these skills during the pandemic could be a novel way to support student health.

Art and Science of Human Flourishing Course

To nurture such skills in students and thus support student mental health, universities have explored various innovative educational approaches to college student well-being in recent years both before and after the pandemic.¹⁸ Such efforts have included short-term trainings on skills of well-being,¹⁹ mobile app-based mindfulness interventions,²⁰ and academic courses on the philosophy of happiness.²¹

Another unique approach to supporting college student mental health has been through “contemplative education”, a kind of pedagogical approach aimed at cultivating mindful and compassionate awareness of oneself (e.g., bodily sensations, emotions, thoughts), as well as

empathic and compassionate connections with others and nature.²² Central to contemplative education is the teaching of contemplative practices designed to build students' skills of attention, awareness, empathy, perspective taking and compassion for self and others.²³ Deriving from a rich history of various cultures and tradition, contemplative practices include mind-body exercises such as focused attention practice, open-monitoring of awareness practice, self-compassion practice, body scan practice, and loving-kindness practice.¹⁸ While most university efforts to teach contemplative practices have been in the form of mindfulness training,²⁴ curricular frameworks that broaden contemplative education to explore flourishing of self, others and the planet have been developed for college-aged students.¹⁷

To address the student mental health crisis prior to the COVID-19 pandemic, an interdisciplinary group of scholars at three universities built a contemplative education curriculum for a new undergraduate course entitled *Art and Science of Human Flourishing* (ASHF). ASHF is a three-credit undergraduate course that aims to teach students skills and perspectives that research has linked to the promotion of human flourishing.¹⁷ The course is cross-listed in multiple units and fulfills general education requirements at the three participating universities. Examples of course topics include resilience, mindfulness, compassion, and aesthetics, and practices that align with these qualities include meditations on breath awareness and loving kindness, journal reflections, and mindful art making (see Supplementary Material for course framework and structure).

Figure 1 outlines the ASHF hypothesized theory of change. Through experiential and academic learning opportunities (e.g., contemplative practices, weekly readings) situated in a safe learning environment, students will practice and improve upon proximal skills of attention, social emotional competencies, and perspectives on flourishing. The skills and competencies, in

turn, will improve distal outcomes related to student health and well-being (e.g., flourishing, depressive symptoms, sleep quality).

A formal evaluation of ASHF across the universities was undertaken in Fall 2018.^{4,25} A multi-wave, multi-site trial (N = 651) found that ASHF enrolled students reported significant greater increases in attention and social-emotional skills, such as mindfulness, self-compassion, empathic concern, common humanity, and overall flourishing, compared to comparison students.⁴ Enrolled students also reported significant decreases in depressive symptoms, including the prevalence of severe depression. Furthermore, Authors²⁵ found the positive effects on student flourishing qualities were consistent across the three universities, despite some variation in pedagogical techniques (e.g., lecture, class activities) and student engagement (i.e., amount of outside contemplative practice). These findings suggest that the ASHF course is a promising approach to supporting attention and social-emotional skills, flourishing perspectives, and the mental health of college students.

Current Study and Hypotheses

Here we explore the effects of college students' participation in a virtual-synchronous version of ASHF on mental health and well-being during the Fall 2020 semester amidst the COVID-19 pandemic. As a result of the pandemic, ASHF was converted into a synchronous, virtual format and students participated remotely.

The study design began in the Fall 2020 semester using a pre/post/5-month follow-up, multi-site, quasi-experimental study. Based on the theory of change and previous ASHF studies, we hypothesized that the course would improve the same student outcomes in the virtual, synchronous setting. That is, relative to comparisons, we predicted ASHF students would report greater pre/post positive changes in proximal and distal outcomes such as attention skills, social-

emotional skills, and health and well-being (i.e., flourishing, depressive symptoms, sleep quality), as well as pre/follow-up change in distal outcomes of health and well-being. To examine these hypotheses, we assessed outcomes at the beginning of the Fall 2020 semester (T1), end of the Fall 2020 semester (T2), and end of the Spring 2021 semester (T3).

Methods

Participants

Data were collected from undergraduate students who were enrolled in one of the three large public four-year institutions located in the Mid-Atlantic region, the Northeast, and the Midwest (for more information on site demographics, see Authors²⁵).

The intervention group was composed of students who elected to enroll in the ASHF course in the Fall 2020 semester. Because the ASHF course fulfills a general education requirement, participating students represented a variety of undergraduate majors and interests. The comparison group was composed of non-ASHF enrolled students randomly selected to receive study information. The target comparison sample size was based on the assumption that 50% of eligible ASHF enrolled students would participate in the research study and that four comparison participants per ASHF-enrolled participants would be needed for the planned 2 Comparison:1 ASHF ratio propensity-score matching procedure.

The initial study sample was 492 (ASHF intervention = 78, comparison = 414). 179 participants were removed due to missing data at baseline, reducing the sample to 313 (ASHF intervention = 56, comparison = 257). Following PSM, the final analysis sample was 168 (ASHF intervention = 56, comparison = 112). There were 16 ASHF and 31 comparisons from University A, 10 ASHF and 21 comparisons from University B*, and 30 ASHF and 60

comparisons from University C. The ASHF final analysis sample represented 25.3% of the student population enrolled in the course at the three universities in Fall 2020. At the five-month follow-up, approximately 75% of the final analysis sample participated in the survey (ASHF intervention = 41, comparison = 85). Results of chi-square tests showed no statistically significant differences (i.e., $p < 0.05$) between baseline characteristics (i.e., gender, race) and attrition at T2 or T3 in either the intervention or comparison group.

ASHF students mostly consisted of first-year students (76.8%) and were predominantly female (76.78%). In terms of race and ethnicity, ASHF students self-identified as 71.43% White, 14.29% Asian, 8.93% Black or African American, 1.79% Hispanic or Latinx, and 1.79% mixed race. The comparison group ($n = 112$) was also predominantly first-year students (84.8%) and female (69.6%). In terms of race and ethnicity, comparison group students self-identified as 73.21% White, 15.18% Asian, 1.79% Black or African American, 4.46% Hispanic or Latinx, 1.79% Middle Eastern or North African, and 3.57% mixed race. Compared to the full student body of the three universities, which, on average, is approximately 60% White and 52% female, the final analysis sample was disproportionately White and female.

Procedure

In the Fall 2020 semester, all three universities were operating in a new learning mode due to campus closures caused by the COVID-19 pandemic. Prior in-person study procedures that were in place to evaluate course effects in Fall 2018 and Fall 2019 were adapted for the virtual study environment. All study procedures (i.e., recruitment, consent, course delivery, survey completion) was conducted remotely.

* University B restricted the course size, hence the smaller ASHF sample size.

Recruitment of the intervention group occurred through in-class announcements and emails, and recruitment for the comparison group occurred through an email describing a research study on student well-being. After students consented to participate, they were directed to a pre-test survey. Recruitment occurred during the first two weeks of the Fall 2020 semester. The timing of the consent and pre-test completion window meant that ASHF intervention students could have completed up to two weeks of coursework (foundations of flourishing) before participating in the pre-test survey. About 15 weeks after the pre-test window (December 2020), participants were invited to complete the post-test survey. Participants were then contacted a third time in May of 2021 to complete the follow-up survey (about 4 months after the post-test window). All surveys were administered electronically via Qualtrics. While there were slight variations in compensation by university, all students were compensated at least 40 dollars for completing the three surveys. Students in the treatment and comparison groups were offered the same incentives. Study procedures were approved by each university's Institutional Review Board.

The virtual adaptation of the ASHF course maintained key elements of the in-person version, including the same weekly lectures, discussions, readings, and meditation practices. Students also continued to access the course material using the same online learning platform. The overall structure of the course, including content domains and assignments, were similar between the three universities. All the instructors of the virtual format at each university had previously taught the course in an in-person setting. Instructors were free to personalize teaching styles and pedagogical techniques (see Authors²⁵). The course met three days per week for 50 minutes. Two days each week were typical lecture-based classes, and the third day was a contemplative practice "lab" where students learned and practiced a variety of contemplative

meditations. The virtual format of the course allowed for use of an online chat box and breakout rooms to support group discussions.

Measures

To assess effects of the ASHF course, a variety of measures were selected based on the proximal and distal outcomes hypothesized by the course theory of change and assessed in previous studies (Figure 1; Authors⁴). Table 1 includes a description of each measure, including reliability statistics. Likert scales from 1-5 were standardized to 1= Not at all true for me to 5 = Very true for me. Otherwise, original response anchors were used. All measures were assessed at pre and post-course at all three universities.

The use of a clinical measures to assess depressive symptom scores (Patient Health Questionnaire) allowed us to additionally assess changes in clinical and severe depression prevalence.²⁶ Standardized dichotomous cut-points were used to create category scores: ≤ 8.87 = not clinical and > 8.87 = clinical depressive symptoms; and ≤ 13.32 = not severe and > 13.32 = severe depressive symptoms.^{13,27}

Data Analyses

Because designing a randomized trial for a university course was not possible, we used propensity-score matching (PSM) to conduct a quasi-experimental evaluation of course effects. Participants who completed at least 50% of pre-test items were included in the PSM regardless of post-test and follow-up completion. Gender was conceptualized as a binary variable (male/female) within the models due to only two students identifying as non-binary.

Missing data at T1 ranged from 3.25% [attention function] to 9.53% [compassion toward others]. We used the MatchIt/MatchThem packages in R to conduct the PSM procedure.^{28,29} MatchIt/MatchThem requires complete data on all variables to be entered into the PSM

procedure. Therefore, before conducting the PSM procedure, we used the MICE package in R to multiply impute 50 complete datasets.³⁰ The PSM procedure was conducted on each of these complete datasets and then pooled according to Rubin³¹. Baseline scores on all outcomes variables and demographic variables included in analyses (gender, race, university site, and undergraduate year) were entered into the multiple imputation and PSM procedures. Before moving to the PSM procedure, we confirmed the plausibility of the imputed datasets using standard approaches (e.g., plotting distributions, examining descriptive statistics).

For PSM, we utilized the nearest-neighbor approach, where two comparison participants were chosen for every one intervention participant based on the nearest propensity score. Diagnostic tests of the PSM procedure, including balance statistics, qqplots, and a love plot (see Supplementary Materials), were run to ensure a balanced matched comparison group. To further assess the matching procedure, baseline differences between the intervention group and PSM comparison group were analyzed for each demographic variable and outcome measure using independent sample t-tests on all T1 scores.

Linear mixed-effects models (time nested within participants) with maximum likelihood estimation were used to assess pre/post/follow-up effects of the virtual ASHF course on student outcomes. To align with the course theory of change (Figure 1), all proximal and distal outcomes were assessed at post-course, and only distal outcomes were assessed at follow-up. All models controlled for participant gender, race and university site and were weighted using the inverse probability of the propensity score. Weighting on the inverse probability of the propensity-score achieves “doubly robust estimates,” ensuring that average intervention effects are unbiased so long as one of the PSM or regression models is correctly parametrized.³² Little’s MCAR test indicated that the data met the Missing at Random (MAR) assumption.³³ As such, missing data

was handled using full-information maximum likelihood, which estimates the regression models based on all available information and is robust to data missing at random.³⁴ False discovery rate correction was assessed across all post- and separately follow-up test outcomes to ensure the false discovery rate did not exceed $p < .05$.³⁵

Results

Diagnostics of the 2:1 propensity-score matching procedure demonstrated that the comparison group was a balanced match for the intervention group ($N = 168$; ASHF intervention = 56, comparison = 112). Standardized mean differences for all covariates were $< .10$.

† Independent sample t -tests indicated that the two groups did not significantly differ on gender, $X^2 = 0.28$, $p = .594$, race, $X^2 < 0.01$, $p = .999$, undergraduate year (dichotomized first or other) $X^2 < 1.14$, $p = .285$, or university site, $X^2 < 0.03$, $p = .987$. There were no group differences on baseline scores of any outcome measure.

Proximal Outcomes at Post-Test

In alignment with the theory of change (Figure 1), both proximal (e.g., attention skills, social emotional skills) and distal outcomes (e.g., flourishing, depressive symptoms) were examined immediately following the course. Means and standard deviations for all outcomes at baseline (T1) and post-test (T2) are reported in Table 2. Model-based post-test standardized mean group differences on all outcomes are displayed in Figure 2.

† With the exception of the Search for Meaning measure ($SMD = 0.11$). Similar to the in-person evaluation study (Authors, 2022), this measure was included in both the multiple imputation and PSM procedures but was not hypothesized in the course theory of change and, therefore, not examined in analyses.

Attention Skills. ASHF students showed greater overall attention function $b = 0.85$, $se = 0.20$, $p_{FDR} < .001$, Cohen's $d = 0.64$ 95% CI[0.31, 0.97] and higher mindfulness $b = 0.19$, $se = 0.07$, $p_{FDR} = .019$, $d = 0.34$ [0.02, 0.66] at post-test relative to PSM comparisons.

Social-Emotional Skills. ASHF students showed greater improvements relative to PSM comparisons on compassionate roommate goals $b = 0.79$, $se = 0.35$, $p_{FDR} = .030$, $d = 0.42$ 95% CI[0.10, 0.74], but not self-compassion $b = 0.11$, $se = 0.11$, $p_{FDR} = .310$, $d = 0.13$ CI[-0.19, 0.45] at post-test.

Flourishing Perspectives. ASHF students showed greater improvements on common humanity $b = 0.57$, $se = 0.12$, $p_{FDR} < .001$, $d = 0.74$ [0.41, 1.07] compared to PSM students at post-test.

Mental Health & Well-being. ASHF students showed greater improvements relative to PSM comparisons on flourishing $b = 0.59$, $se = 0.22$, $p_{FDR} = .015$, $d = 0.41$ [0.09, 0.73]. With regard to depressive symptomology, ASHF students also showed greater reductions in depressive symptoms $b = -0.29$, $se = 0.12$, $p_{FDR} = .023$, $d = -0.36$ [-0.68, -0.04] a lower likelihood of clinical depressive symptoms $b = -1.79$, $se = 0.90$, $p_{FDR} = .015$, $d = -0.34$ [-0.66, -0.01] and a lower likelihood of severe depressive symptoms post-course $b = -1.10$, $se = 0.39$, $p_{FDR} = .014$, $d = -0.21$ [-0.53, -0.11].

While mean differences favored ASHF students, there was a non-significant effect of course participating on sleep quality $b = 0.25$, $se = 0.14$, $p_{FDR} = .073$, $d = 0.33$ [0.01, 0.65].

Distal Outcomes at Follow-Up

In alignment with the course theory of change (Figure 1), only health and well-being outcomes (e.g., flourishing, depressive symptoms, sleep quality) were examined at the five-month follow-up (T3). Means and standard deviations for all outcomes at follow-up are reported

in Table 2. Model-based follow-up standardized mean group differences on all outcomes are displayed in Figure 3.

Mental Health & Well-being

At follow-up, small magnitude ASHF-related gains on flourishing persisted, but they were not statistically significant $b = 0.47$, $se = 0.24$, $p_{FDR} = .249$ ($p_{uncorrected} = .049$), $d = 0.32$ CI[-0.05, 0.70]. Similarly, reductions in average depressive symptoms also persisted for the ASHF group, but were not significantly different between groups $b = -0.14$, $se = 0.13$, $p_{FDR} = .453$, $d = -0.21$ [-0.58, 0.16]. Effects on clinical depressive symptoms did not persist at follow-up $b = 0.06$, $se = 0.76$, $p_{FDR} = .933$, $d = 0.01$ [-0.36, 0.38], nor did effects on severe depressive symptoms $b = 0.12$, $se = 0.43$, $p_{FDR} = .453$, $d = 0.02$ [-0.35, 0.39]. At follow-up approximately five months later, statistically non-significant improvements on sleep quality favoring the ASHF persisted at a similar magnitude as post-course $b = 0.22$, $se = 0.15$, $p_{FDR} = .351$, $d = 0.38$ [0.00, 0.75].

Discussion

We explored how participating in a virtual, synchronous course on human flourishing during Fall 2020 of the COVID-19 pandemic affected student outcomes related to mental health and well-being. As hypothesized in the course theory of change (see Figure 1), results showed that ASHF course participants, compared to a comparison group, showed post-test improvements in proximal and distal outcomes, including attention skills, social and emotional skills, and flourishing. Specifically, students showed significant post-course increases in attention function, mindfulness, compassion for their roommate, sense of common humanity, and sense of overall flourishing, as well as decreases in depressive symptoms. Effect sizes indicated moderate to large course impacts on these proximal outcomes. In addition, at post-test enrolled students reported significant, small-moderate decreases in clinical depression and severe depression,

compared to comparisons. While relative improvements in flourishing, depressive symptoms, and sleep quality persisted for intervention vs. comparison students at the five-month follow-up, the differences at follow-up were not statistically significant.

This study contributes to two previous studies on the ASHF course that explored in-person student outcomes and variation in course pedagogy at the same three universities.^{4,25}

When considering these studies together, it appears that course effects on student mental health and well-being are robust across various settings (i.e., virtual and in-person), locations (i.e., different universities), and samples of undergraduates.

Comparing Virtual and In-Person Course Outcomes

The virtual version of the human flourishing course explored here showed statistically significant improvements on many of the same outcomes as the in-person version.⁴ Post-course outcomes that were significant in both virtual and in-person formats included increased attention skills, compassion, common humanity, and overall flourishing.[‡] Post-course effect sizes were comparable in magnitude across the in-person and virtual versions. Similarities in outcomes across course format (in-person and virtual) could be explained given that core pedagogical techniques utilized in the in-person course (e.g., lectures, contemplative practices, class activities) were still able to occur in the virtual environment. At the same time, the similarity of outcomes across formats is particularly interesting given that the virtual study was conducted during a global pandemic when student stress was remarkably high.

[‡] Authors (2022) did not assess follow-up outcomes of the course; therefore, only immediate post-course effects could be compared.

In addition, enrollment in both virtual and in-person formats was related to post-course reductions in depressive symptoms, including levels of clinical and severe depressive symptoms. Follow-up assessment of the virtual format indicated continuing but non-significant course effects; ASHF students returned to baseline levels while comparison students showed slight increases in symptomology. As concern grows over the increased prevalence of depression among undergraduate students,^{6,36} effects of the Art and Science of Human Flourishing course on student depressive symptoms is particularly interesting, given that this intervention takes the form of an academic course that fulfills undergraduate requirements.

A notable difference in effects between the virtual and in-person versions was on the outcome of self-compassion, which showed a small, non-significant effect in the virtual version and a moderate, significant effect in the in-person version. The historical context of the COVID-19 pandemic may have contributed to these results. Given the increased stress, fear, and worry around students' academic and social lives during this time,³⁷ improving students' sense of self-compassion may have been a particularly challenging task.

Insights on Contemplative Education and Virtual Learning

This study contributes to a growing body of evidence that it is possible to effectively implement contemplative trainings in a virtual, synchronous format for young adults. Other studies have found that virtual, synchronous mindfulness and compassion-based trainings have positive effects on non-clinical high school students and undergraduate students.^{38,39,40} Similarly, undergraduate students who participated in a mindfulness intervention that integrated both synchronous and asynchronous components showed improvements in healthy outcomes, including reductions in mental health symptoms.⁴¹ Although fully asynchronous mindfulness interventions have been shown to contribute to lower stress in participants, studies have

concluded that a fully-asynchronous format is not equally effective as typical face-to-face mindfulness programming.⁴² It is likely that face-to-face interaction with instructors and peers is an important contributing factor to program effect, even if this interaction occurs virtually.

Virtual, synchronous delivery of contemplative trainings may support young adults' developmental needs in unique ways. This format offers convenience, privacy, and autonomy, while also offering opportunity for real-time social relatedness and connection. Students have reported that virtual delivery of contemplative training is convenient, allows for greater focus on content without being distracted by peers, and allows for greater comfort when engaging in meditation practice.³⁸ In addition, the use of a virtual chat box provided choice of whether students wanted to speak verbally or through writing. Although college students were less satisfied about online learning during the pandemic,⁴³ it could be that students are more open to this type of learning when it is in combination with other in-person college courses and experiences. As interest in flourishing education expands,⁴⁴ virtual, synchronous formats may support program dissemination and scaling that also meets the needs of young people.

Contributing to Undergraduate Education on Well-being

This study also contributes to the existing literature on undergraduate courses that target student well-being. One type of course, commonly referred to as “Good Life” courses, focus primarily on philosophical perspectives related to happiness and are most often housed in Philosophy or Religious Studies departments.²¹ A recent review of “Good Life” courses across 13 U.S. universities found that students who participate in them show statistically significant pre-post improvements in sense of purpose, but no change in outcomes related to well-being.²¹ Similar efforts to develop academic courses on happiness and well-being have also emerged in Psychology departments. These courses, some of which were offered during the COVID-19

pandemic, focus primarily on scientific perspectives related to character strengths, happiness, and positive psychology.⁴⁵ A recent meta-analysis of positive psychology courses around the world (approx. 40% from the U.S.) found promise for these courses supporting student psychological well-being, although evidence of null and negative effects was also found in some studies.⁴⁶

What the current study contributes to the literature on university well-being courses is how contemplative education, as an integration of the “arts” and “sciences,” represents a novel approach to support student well-being. The positioning of existing courses within either Humanities or Psychology represents a common split between academic departments at colleges and universities.⁴⁷ Developing a contemplative-based course that merges the arts, humanities, and sciences may provide a more holistic approach to well-being that includes different ways of knowing - including both “embodied” (i.e., sensing, feeling) and “mental” (i.e., thinking) forms of learning. As this study demonstrated, this contemplative education approach supports the psychological well-being of students across various attentional and social-emotional outcomes. Future efforts to support student well-being on university campuses might consider how the field of contemplative education can inform new frameworks for developing academic courses on flourishing.

Limitations and Future Directions

Although the Art and Science of Human Flourishing course has now been evaluated across multiple years and contexts,^{4,25} we continue to seek ways to ensure the research evaluation and course curriculum is inclusive and generalizable.

Across our studies, potential demand characteristics associated with self-selecting into a course on flourishing may influence the way students respond to survey items. As awareness of

the course grows at the three campuses, students may be drawn to the course based on personal characteristics or course expectations and want to demonstrate a level of growth on post-course measures.⁴⁸ The small sample size also limits the generalizability of findings to other undergraduate students. For example, the ASHF students who completed the five-month follow-up survey represented only 52.5% of the original study enrolled ASHF group. In addition, student samples used to evaluate the course have been disproportionately White and female, indicating the need for a more diverse sample that represents a wider range of gender and racial identities. Future studies on the course, as well as other studies on college student flourishing, will need to explore how to engage a larger, diverse student population in programming and research. One way to support enrollment of various student identities in the ASHF course, and therefore recruitment of a more diverse study sample, is to ensure the course is continuously culturally and developmentally relevant in terms of curriculum and instructors. For example, involving instructors and guest lecturers who can offer diverse perspectives will be important moving forward, especially to help teach and honor various traditions and views of flourishing.⁴⁹ An advantage of a virtual or hybrid (i.e., combination of virtual and in-person) version of the course is that it allows for a wider range of guest lecturers who can present without being physically present on the college campus.

In addition, the breadth and length of the 15-week course means that the effect on student outcomes may not be fully captured in the selected measures of this study. Measures were chosen to align with major course themes and the theory of change (Figure 1) but concerns of participant fatigue limited the number of items and measures that could be included in the survey. For example, the one-item measurement of sleep quality did not adequately capture the various facets of sleep; however, was chosen from a larger valid measure⁵⁰ on sleep

characteristics. To capture more complexity, future studies could include a qualitative component where students express what they learned from the course and to what degree they perceived the course had an effect on their well-being and mental and physical health. Additional measures, such as improvements in student general health, resilience, or sense of purpose, as well as administrative data on time to degree completion, choice of major, and other aspects of belonging and integration into campus life could add to study findings and expand the range of outcomes associated with the theory of change.

Finally, given the historical context in which this study occurred, assessing the effects of a virtual, synchronous version of ASHF outside the influence of the COVID-19 pandemic would be insightful. Since the pandemic, universities are reimagining the role of virtual learning in undergraduate education and many are continuing to offer synchronous,⁵¹ virtual courses. Assessing implementation and effects of different delivery modes will be important to support future scaling and dissemination to various student populations. Because of the complexity and evolving nature of the concept of human flourishing in education, continuous evaluation of the course will be needed to ensure the course is meeting young people where they in terms of identity, needs, and context.

Conclusion

Since the COVID-19 pandemic, universities have invested a greater commitment into supporting student mental health and well-being. Many universities have also noted the positive aspects of virtual, synchronous courses and are expanding course offerings that use this format. In this study, an evidence-based undergraduate course on human flourishing was examined in a synchronous, virtual format during the COVID-19 pandemic. The course demonstrated immediate effect on a variety of student outcomes, pointing to the applicability of flourishing

concepts in college students' lives. More work is needed to explore distal outcomes of the course on student mental health and well-being. Although continuous improvement to course content and evaluation is needed to ensure generalizability to other college populations, these results remain promising for the potential of the academic study of human flourishing in higher education. As universities consider innovative ways of promoting student well-being, evidence-based college courses that teach trainable skills of human flourishing could be one way to uniquely meet the needs of today's college students.

Declaration of Interest Statement

Disclosure of potential conflicts of interest. The authors have no competing interests to declare that are relevant to the content of this article.

Ethical approval and informed consent. This study received ethical approval by the Institutional Review Board of each participating institution. Informed consent was obtained prior to subject's participation in the research.

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EFFECTS OF VIRTUAL COLLEGE COURSE ON FLOURISHING

Table 1

Student Outcome Measures Used to Assess Effects of Art and Science of Human Flourishing Course

Proximal and Distal Student Outcomes	Measure Name and Citation	Number of Items	Cronbach's α T1/T2/T3	Example Item
Attention Skills				
Attention function	Attentional Function Index ⁵²	13	.85/.90/.90	How well do you feel you can keep your mind on what you are doing?
Mindfulness	Five Facet Mindfulness Questionnaire ⁵³	15	.72/.76/.71	When I have distracting thoughts or images, I am able to just notice them without reacting.
Social-Emotional Skills				
Self-compassion	Self-Compassion Short-Form ⁵⁴	12	.85/.86/.82	When something painful happens, I try to take a balanced view of the situation
Compassion for college roommate	Compassionate Goals ⁵⁵	7	.98/.99/.99	Today, I tried to be constructive in my comments to my roommate.
Flourishing Perspectives				
Common humanity	Spiritual Transcendence Scale ⁵⁶	4	.87/.88/.89	I feel that on some level my life is intimately tied to all of humankind.
Health & Well-being				
Flourishing	Pemberton Happiness Index ⁵⁷	11	.86/.89/.88	My life is full of learning experiences and challenges that make me grow.
Depressive symptoms	Patient Health Questionnaire-8 ²⁶	8	.87/.90/.89	Over the last two weeks, how often have you had little interest or pleasure in doing thing?
Sleep quality	Pittsburgh Sleep Quality Index ⁵⁰	1	N/A	During the past month, rate your overall sleep quality.

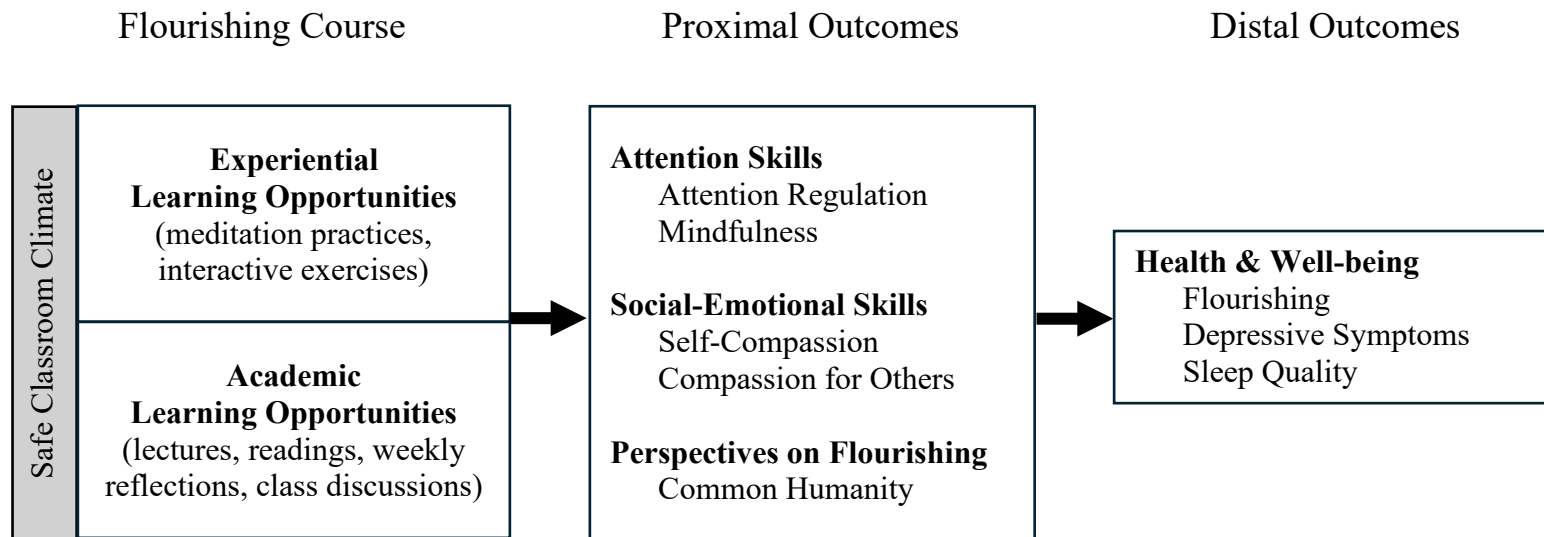
Table 2*Descriptive Statistics of Art and Science of Human Flourishing and Comparison Groups at Baseline, Post-Test, and Five-Month Follow-Up^a*

	Baseline (T1)				Post-Test (T2)				5-Month Follow-Up (T3)			
	ASHF		Comparison		ASHF		Comparison		ASHF		Comparison	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Attention Skills												
Attention function	6.74	1.09	6.78	1.43	7.29	1.12	6.51	1.52				
Mindfulness	3.11	0.58	3.14	0.55	3.37	0.56	3.13	0.51				
Social-Emotional Skills												
Self-compassion	2.78	0.82	2.82	0.73	2.93	0.70	2.80	0.68				
Compassion for college roommate	2.52	1.54	2.48	1.70	3.41	1.78	2.60	2.16				
Flourishing Perspectives												
Common humanity	3.97	0.79	3.91	0.76	4.28	0.67	3.69	0.87				
Health & Well-being												
Flourishing	6.97	1.35	6.85	1.51	7.17	1.38	6.53	1.68	6.98	1.36	6.45	1.59
Depressive symptoms	1.83	0.56	1.84	0.69	1.73	0.66	2.01	0.69	1.83	0.60	1.92	0.68
Sleep quality	1.95	0.52	1.92	0.52	2.00	0.56	1.81	0.58	2.41	0.84	2.16	0.86

^aDescriptive statistics are observed data. ASHF ($n = 56$) students participated in the Art and Science of Human Flourishing course. Comparison ($n = 112$) students selected using propensity-score matching procedures. Attention function and flourishing measured on 1-10 Likert scale. Mindfulness, self-compassion, compassion for college roommate, and common humanity measured on 1-5 Likert scale. Depressive symptoms and sleep quality measured on 1-10 Likert scale. A higher score on all measures indicates a greater self-reported level of the quality. Only distal outcomes (i.e., health and well-being) were assessed at follow-up. T1 = Time 1, T2 = Time 2, T3 = Time 3. *M* = mean; *SD* = standard deviation.

Figure 1

Theory of Change: Art and Science of Human Flourishing Course on Student Outcomes



EFFECTS OF VIRTUAL COLLEGE COURSE ON FLOURISHING

Figure 2

Post-Test Student Effects of Enrollment in Art and Science of Human Flourishing Course

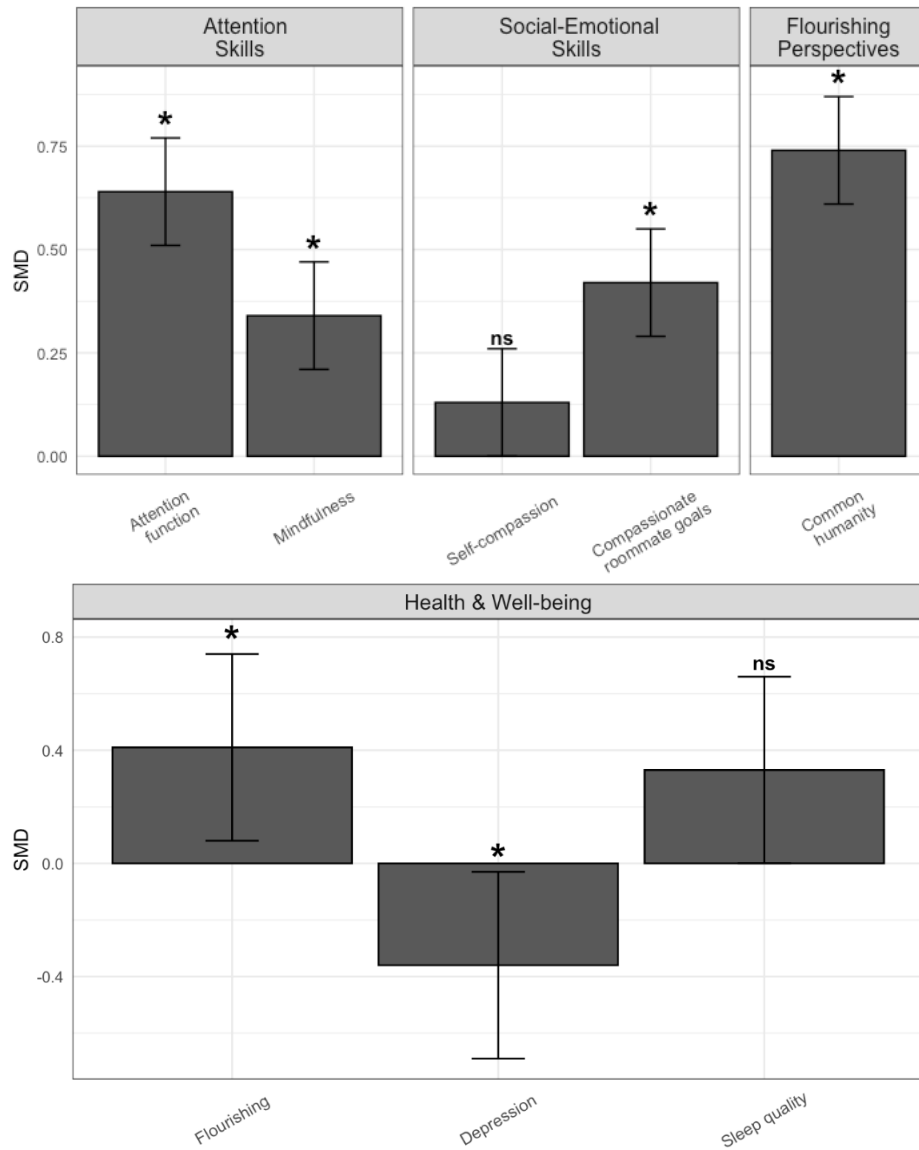


Figure 3

Five-Month Follow-Up Student Effects of Enrollment in Art and Science of Human Flourishing Course

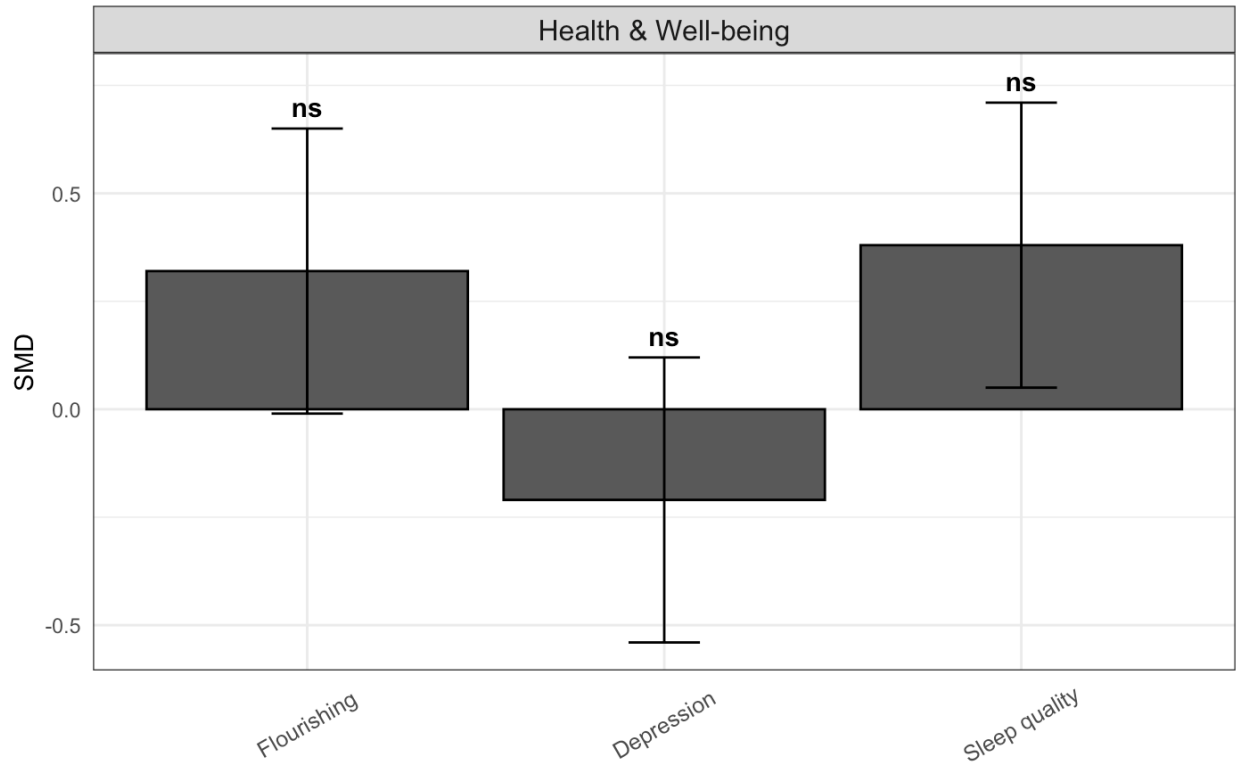


Figure Captions

Figure 1: Adapted from version in Authors (2022). Experiential learning opportunities are predicted to lead to attention and social-emotional skills learning. Academic learning opportunities are predicted to lead to effects on knowledge of and perspectives on flourishing. Both experiential and academic learning outcomes are predicted to effect distal outcomes through students' application of these skills and perspectives.

Figure 2: Model-based post-test standardized mean group differences on all outcomes. Note: SMD, standardized mean difference between ASHF and PSM comparisons at post-test (T2). * $p < .05$ false discovery rate corrected (FDR). ns, not statistically significant ($p > .05$ FDR). Error bars: 95% confidence interval.

Figure 3: Model-based post-test standardized mean group differences on all outcomes. Note: SMD, standardized mean difference between ASHF and PSM comparisons at post-test (T2). ns, not statistically significant ($p > .05$ FDR). Error bars: 95% confidence interval.

Can the Virtual Implementation of a College Course on Human Flourishing Improve Student Flourishing during COVID-19? A Multi-University Study

Supplemental Material

Figure S1
Dimension and Qualities of Flourishing: Art and Science of Human Flourishing Course Curriculum Outline

A STUDENT-FOCUSED MODEL OF HUMAN FLOURISHING

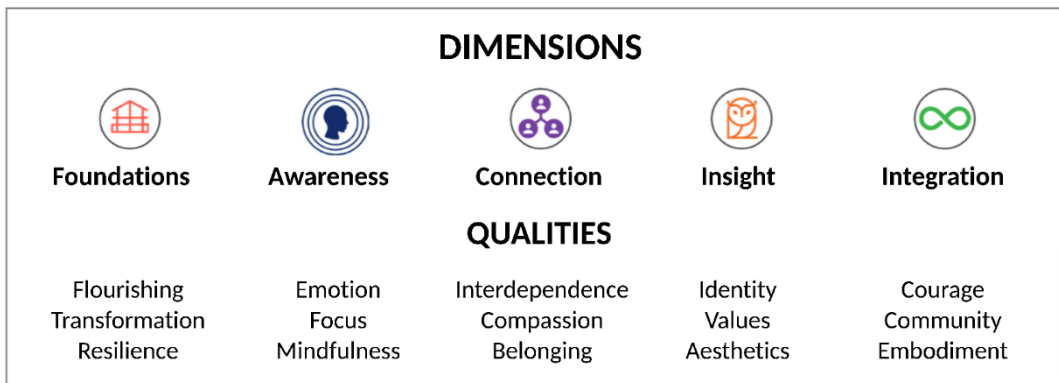


Figure S2

Love Plot of Balance Following Propensity-Score Matching

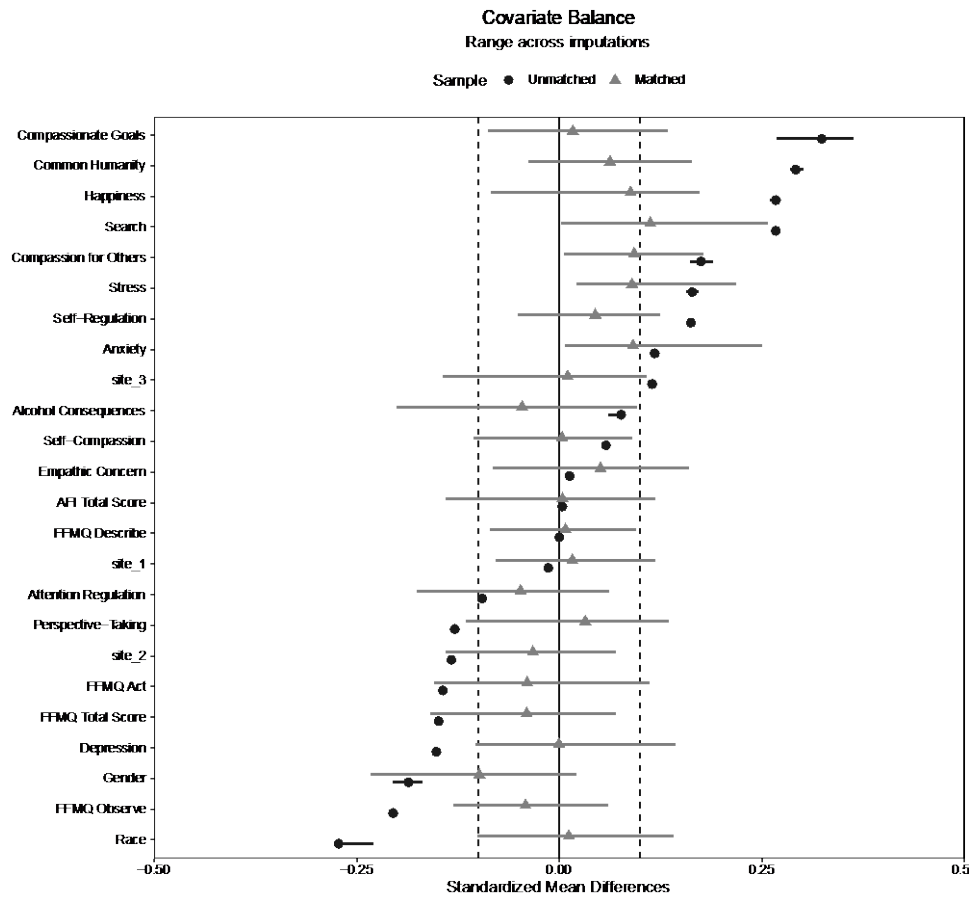


Figure Captions

Figure S1: First published in Hirshberg et al. (2022). Art and Science of Human Flourishing curriculum: dimensions and quality of flourishing. Note: Dimensions represent the five overarching domains of flourishing in the course. Qualities represent the specific knowledge, perspectives, and skills of flourishing taught during the course. Each quality reflects 1 week of course content (15 weeks total).

Figure S2: All variables are T1 scores. Standardized mean difference is between the ASHF and comparison group. Gray triangles: difference between the ASHF and comparison groups prior to matching. Black circles: difference between ASHF and the PSM comparison group (i.e., after matching) based on the 50 complete multiply imputed datasets. Black error bars represent the spread of imputed values across the 50 imputed datasets. Standardized mean differences between -0.10 and 0.10 indicate adequate balance