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An examination of factors impacting learning outcomes and satisfaction across college course formats

Sri Vaishnavi Konagalla
Department of Psychology, Nova Southeastern University, Fort Lauderdale, Florida, USA
Kelly E. Ferreira
Department of Psychology, Nova Southeastern University, Fort Lauderdale, Florida, USA and
Department of Psychology, Trinity College, Hartford, Connecticut, USA, and
Madhavi Menon
Department of Psychology, Nova Southeastern University, Fort Lauderdale, Florida, USA

Abstract

Purpose – Research on student learning outcomes in online versus in-person courses has yielded mixed results, with contextual and individual-level factors playing an important role in shaping student experiences. The present study examined differences in cognitive, social and self-growth learning outcomes and overall course satisfaction between online and in-person college courses, while also investigating the relationships between emotion regulation (ER), self-directed learning behaviors (SDLBs) and sleep quality with these outcomes.

Design/methodology/approach – The current study evaluated student learning outcomes and self-reported course satisfaction in online and in-person college courses through the collection of online survey data with undergraduate students ($N = 159$). ER, SDLBs and sleep were also assessed using previously validated measures.

Findings – Learning outcomes and satisfaction were significantly higher for in-person courses than online courses, and SDLBs were related to better learning outcomes and higher satisfaction in both formats, especially social learning outcomes in in-person classes. Sleep quality was associated with satisfaction in online courses specifically. Although ER was not directly associated with learning outcomes or satisfaction in either format, it was significantly correlated with both SDLBs and sleep, suggesting that ER may exert an indirect influence on academic outcomes through these variables.

Originality/value – These results underscore the importance of self-directed learning in student success, regardless of format, and suggest that while online courses may be convenient, traditional settings may offer more robust learning experiences for many students.

Keywords Learning modalities, Course satisfaction, Self-directed learning, Emotion regulation

Paper type Research article

Introduction

The format of higher education has changed significantly in recent years, with an increased focus towards online education. Driven by technological advancements and accelerated by the Coronavirus (COVID-19) pandemic, online learning has become increasingly prevalent (Dhawan, 2020). As schools and universities transitioned to remote learning, online courses became the primary mode of instruction. As online education continues to expand, understanding its impact on student learning and satisfaction has become increasingly important. While online courses offer greater flexibility and accessibility, concerns remain regarding the quality of instruction and student engagement compared to traditional face-to-face learning (Means, Toyama, Murphy, Bakia, & Jones, 2009). Previous research has yielded

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mixed findings, with some studies suggesting comparable outcomes across modalities (Cavanaugh & Jacquemin, 2015), while others indicate that students may perform better and report higher satisfaction in in-person settings (Xu & Jaggars, 2013). Some research even argues that with well-designed content and effective facilitation, online learning can match or even exceed the outcomes of in-person instruction (Means *et al.*, 2009). Therefore, the primary goal of the current research is to further examine outcomes related to student learning, engagement, and satisfaction and to determine whether outcomes and satisfaction differ across different course formats (i.e. online vs. in-person).

Student learning outcomes by course format

A substantial body of research has examined whether student performance differs across course modalities. Several large-scale studies have found no significant difference in student learning outcomes between online and in-person courses (Cavanaugh & Jacquemin, 2015; Johnson, Aragon, & Shaik, 2000; Means *et al.*, 2009). However, other studies suggest that students in in-person courses may perform better, particularly those who struggle with self-regulation or have limited prior experience with online learning (Callister & Love, 2016; Xu & Jaggars, 2013). The student learning outcomes of these studies are mainly related to academic performance, including final grades, grade point averages (GPA), or performance on course assessments. Other research has shifted to focus on less academically oriented learning outcomes, including the development of critical or abstract thinking, communication skills, and time self-management. Recent research by Zhoc, Chung, and King (2018) examined three types of learning outcomes (which they refer to as "generic" learning outcomes) unrelated to academic performance: cognitive, social, and self-growth outcomes. Cognitive outcomes refer to critical and analytical thinking, problem solving, and viewing situations from a broader perspective. These outcomes also emphasize interpersonal relationships, conflict resolution, and the ability to adapt to diverse group dynamics. Social outcomes include communication skills, leadership and teamwork. Self-growth outcomes include time management and critical self-reflection, contributing to students' ability to manage their own learning processes and engage in personal development (Zhoc *et al.*, 2018). These are important measures of student success not yet explored in the context of online vs. in-person courses in higher education, highlighting the need for the current study. Additionally, whether examining academic or more "generic" learning outcomes, the variability in findings related to course format indicates that learning outcomes may depend on contextual factors, such as course design and student characteristics.

Post-pandemic research has further revealed the complexity of modality comparisons. Alarifi and Song (2024) found that initial score differences largely disappeared after accounting for individual factors such as gender and prior academic performance. Bright and Vogler (2024) found that students with lower self-efficacy preferred and performed better in face-to-face formats, and Kaba *et al.* (2024) documented that the pre-COVID achievement gap narrowed after the pandemic, primarily because in-person outcomes declined to match online ones. These findings highlight the need to consider broader contextual factors, including the lasting effects of pandemic-era disruptions on student preparedness.

Online courses can be implemented in a variety of ways, including asynchronous, synchronous, and hybrid designs. Asynchronous courses allow students to access materials and complete assignments on their own schedule, usually without real-time instruction. Synchronous courses involve live, scheduled sessions where students and instructors meet virtually at the same time. Hybrid courses combine elements of both, typically featuring some live instruction alongside flexible, self-paced components. Existing research has examined student outcomes across different course formats, with some finding that synchronous learning and active instructor presence is preferred over asynchronous courses in terms of students' psychological health and course satisfaction (Fabriz, Mendzheritskaya, & Stehle, 2021; Ratan *et al.*, 2022). It is important to note that these findings were specific to emergency remote

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teaching conditions during COVID-19, which differed substantially from intentionally designed online courses. However, emotional and personal stressors remain a pervasive feature of students' lives beyond the pandemic context, and their potential influence on course perceptions cannot be assumed to have dissipated. Future research should directly assess individual-level stressors as a potential contributing factor. Other studies had conflicting results, with some finding that fully online students have higher dropout rates, but better academic performance for those who stayed in the course when compared to fully in-person (traditional) students, with other studies reporting more desirable learning outcomes in students taking traditional and hybrid courses but not online courses (Faulconer, Griffith, Wood, Acharyya, & Roberts, 2018; Xing & Saghaian, 2022). It is important to note that these studies were specific to academic performance and did not investigate other psychological factors. Of note, although research has identified meaningful differences among these delivery sub-types, the present study examines online and in-person courses at the broad modality level in order to establish overall differences in learning outcomes and key psychological variables across formats.

Post-pandemic research has extended these findings beyond the emergency remote teaching context. Hari Rajan, Herbert, and Polly (2024) found persistent disruptions to student motivation and engagement upon returning to campus, while online environments continued to challenge some students' ability to stay motivated. Increasingly, faculty creativity and intentional course design have become critical in bridging the engagement gap between modalities (Martin & Borup, 2022).

Potential factors that influence learning outcomes

In addition to looking at the effects of class format, research has also examined various interpersonal variables related to student learning outcomes and course satisfaction: emotion regulation (ER), self-directed learning behaviors (SDLBs), and sleep. ER is adaptively regulating emotions in oneself or others, a fundamental skill that can significantly impact one's overall well-being and interpersonal interactions, including learning outcomes and academic satisfaction (Andrés *et al.*, 2017). Studies using the Difficulties in Emotion Regulation Scale (DERS) have linked higher ER difficulties to a range of negative academic-related outcomes in college students. For example, in a study of nursing students, higher DERS scores were significantly associated with increased levels of internet addiction, suggesting that poor ER (particularly difficulty managing impulses and accessing effective regulation strategies) may contribute to compulsive online behavior interfering with academic responsibilities (Özer, Altun, & Avşar, 2023). Similarly, another study found difficulties in the ability to implement ER strategies (as measured by the DERS "Strategies" subscale), were significantly associated with higher levels of academic procrastination among undergraduate students, even after accounting for symptoms of anxiety and depression (Bytamar, Saed, & Khakpoor, 2020).

Related to ER are SDLBs, which involve students taking charge of their learning by setting realistic goals, being disciplined with their learning, and self-monitoring their progress (Zhoc *et al.*, 2018). Academically, SDLBs are a valuable attribute for students. Self-directed students demonstrate a high degree of intrinsic motivation and autonomy, enabling them to be more active participants in their education. This approach encourages them to think critically both inside and outside the classroom. Many students were especially encouraged to utilize more SDLBs during the COVID-19 pandemic. Previous research has shown that SDLBs have been correlated with greater academic performance and learning outcomes. For instance, students with higher emotional intelligence were found to be more self-directed, leading to higher achievement in academic and personal development (Zhoc *et al.*, 2018). Rather than relying solely on external guidance, self-directed students take charge of their learning process with intrinsic motivation. Overall, in multiple studies, higher levels of adaptive ER were positively associated with increased SDLBs, and both of those factors were related to increased student learning outcomes (Andrés *et al.*, 2017; Bytamar *et al.*, 2020; Zhoc *et al.*, 2018).

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Finally, sleep represents a potentially important yet understudied contextual variable in the comparison of online and in-person learning. Online courses, particularly asynchronous formats, may disrupt established sleep routines through flexible scheduling that allows late-night studying and irregular work patterns, potentially affecting sleep quality and duration. In contrast, in-person courses impose external scheduling that may encourage more consistent sleep-wake cycles. More broadly, research consistently links better sleep to higher academic performance and improved learning outcomes, whereas inadequate sleep can impair both academic performance and health (Owens, Christian, & Polivka, 2017). Sleep studies and self-reported sleep measures consistently indicated that improved sleep quality is linked to a range of enhanced cognitive functions, such as improved learning and memory abilities (Okano, Kaczmarzyk, Dave, Gabrieli, & Grossman, 2019). Multiple studies have found that better quality, longer duration, and greater consistency of sleep correlate with higher academic performance (Okano *et al.*, 2019; Owens *et al.*, 2017; Roth *et al.*, 2002). However, there has not been as much literature relating sleep with course satisfaction, as well as learning outcomes specifically comparing course formats.

Comparing online and in-person learning is complex, as student experiences are shaped by instructor preparation, institutional policies, course discipline, assessments, linguistic backgrounds, and the financial costs of enrollment and technology access. Given these inconsistencies observed in studies about student learning outcomes and course satisfaction, further research is warranted to clarify how course modality impacts students' educational experiences. The present study seeks to contribute to this body of knowledge by exploring differences in student learning outcomes (cognitive, social, and self-growth) and course satisfaction between online and in-person college courses. In doing so, it addresses both academic and psychological dimensions of student success. Moreover, this study examines how additional variables, including ER, SDLBs, and sleep, relate to learning outcomes and satisfaction across instructional formats. These factors have emerged as critical to student well-being and academic performance, particularly in the context of independent learning environments. By examining these interconnected elements, the present study aims to provide a more comprehensive understanding of the student experience in contemporary higher education.

Methods

In the following sections, we report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study, and the study follows Journal Article Reporting Standards (JARS; Appelbaum *et al.*, 2018). Materials and analysis code for this study are available by emailing the corresponding author. This study's design and its analysis were not pre-registered.

Participants

A power analysis was conducted using G*Power (Erdfelder, Faul, & Buchner, 1996) to determine the minimum sample size needed for a paired-samples *t*-test with a specified effect size, alpha level, and desired power. The power analysis indicated that a sample size of 45 would be required to achieve a statistical power of 0.95 at an alpha level of 0.05 when testing for 0.5 effect size. Participants were recruited to complete the anonymous survey through convenience sampling, including through the university psychology department research participant pool and through other university online courses. Participants earned course credit (for introductory psychology) or extra credit as compensation for completing the study. In order to participate, participants were required to be 18 years of age or older and currently taking college courses. A total of 194 participants began the survey, with three removed due to non-consent. An additional 16 participants were removed due to not completing any additional questions beyond the consent, one was removed for not meeting inclusion criteria, and five

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participants were excluded from analyses because they completed <10% of the survey. Ten participants had never taken online courses, and their data was removed in the analyses comparing in-person and online outcomes, leading to data from a total of 159 participants (128 females, mean age = 19.2 years, SD = 1.3, range = 18–26; see Table 1 for full participant demographics) who took both online and in-person courses. This research was approved by the University Institutional Review Board (IRB #2023–642).

Table 1. Participant demographics

	N	%
Gender		
Female	128	75.7
Male	24	14.2
Nonbinary/Other	16	9.5
Race		
White/Caucasian	89	52.7
Black/African American	32	18.9
Asian/Pacific Islander	27	16.0
American Indian/Alaska Native	1	0.6
Multiracial	12	7.1
Other	8	4.7
Ethnicity		
Hispanic	48	28.4
Non-Hispanic	121	71.6

	Mean	SD
Age	19.17	1.3
DERS	48.83	11.7
SDLI	75.71	12.3
GSAQ-9	25.81	6.3
Learning outcomes: overall		
In-Person	104.28	9.0
Online	97.25	9.9
Learning outcomes: cognitive		
In-Person	34.25	3.4
Online	32.82	3.7
Learning outcomes: social		
In-Person	34.95	3.5
Online	30.43	4.3
Learning outcomes: self-growth		
In-Person	35.08	3.2
Online	34.00	4.0
Course satisfaction		
In-Person	11.37	2.5
Online	9.95	3.0

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Procedure and measures

The entire survey was conducted online via a Qualtrics link, and consisted of 110 items, most of which were close-ended questions, some with a typed response option if "other" was selected. Additionally, there were four open-ended questions asking participants to enter a number (e.g. how many online courses are you taking?). Once participants opened the survey link, they were presented with information about the study, details regarding data confidentiality, and the option to accept or decline participation. Those who declined were directed to the end of the survey and were not shown any questions. Participants who provided consent proceeded to complete the survey, which took approximately 20–30 minutes. The survey was separated into three sections. The first section collected information regarding participant's ER, SDLBs, and sleep. To assess ER, the Difficulties in Emotion Regulation Scale- Short Form (DERS-SF; Kaufman *et al.*, 2016) was used. The DERS-SF assesses dysregulation on six scales: non-acceptance on emotional responses, difficulties engaging in goal-directed behavior, difficulties with impulse control, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. Items from the DERS-SF include statements such as "When I'm upset, I have difficulty controlling my behaviors" and "When I'm upset, I have difficulty thinking about anything other than what I'm upset about". These items reflect the kinds of ER difficulties most relevant to academic functioning, including the ability to stay on task and manage distress without behavioral disruption. Participants responded to how often each item applies to them using a five-point scale (from 1 "almost never" to 5 "almost always"). Scores were calculated for each of the six subscales for descriptive purposes, with the composite score reflecting overall emotion dysregulation used in the analysis examining the role of ER on learning outcomes and overall course satisfaction.

To assess SDLBs, the Self-Directed Learning Instrument (SDLI; Cheng, Kuo, Lin, & Lee-Hsieh, 2010) was used. The SDLI includes 20 items, with four domains: learning motivation, planning and implementing, self-monitoring, and interpersonal relationships. Example items include "I set learning goals for myself" and "I evaluate my own learning progress", which directly capture the goal-directed, autonomous learning behaviors theorized to support academic performance across course formats. Each item is rated on a 5-point Likert scale (from 1 "strongly disagree" to 5 "strongly agree"). A composite SDLI score, ranging from 20 to 100 where higher scores indicate higher levels of SDL abilities, was used in the analysis.

Finally, to assess sleep, the 11-item Global Sleep Assessment Questionnaire (GSAQ; Roth *et al.*, 2002) was used. Items include questions about frequency of difficulty falling asleep, waking during the night, and feeling unrefreshed upon waking, all of which capture dimensions of sleep quality relevant to daytime cognitive functioning and academic engagement. Responses were rated on a 4-point Likert scale (from 1 "never" to 4 "always"). Overall scores range from normal (0–2), mild (3–5), moderate (6–8), to severe (9–12).

The second section of the survey collected information about in-person coursework and online coursework, with student learning outcomes for both formats included in this section. Items measuring satisfaction with both professors and the overall course were asked for both online and in-person courses (see Table 1). The Student Learning Outcomes Scale (SLOS) used was derived from a study by Zhoc *et al.* (2018) consisting of 15 items that measure student evaluation of their achievement in cognitive, social, and self-growth outcomes. Example items include "I have developed my ability to think critically and analytically" (cognitive outcomes), "I have improved my ability to work effectively with others" (social outcomes), and "I have become more aware of my own strengths and weaknesses" (self-growth outcomes). Each item is rated on a 4-point Likert scale (from 1 "not at all" to 4 "a lot"). The measure provides student learning outcome scores for each outcome domain (cognitive, social, self-growth), and an overall student learning outcome score. A previously conducted confirmatory factor analysis supported the three domains calculated by the scale, and this measure was shown to be reliable, with alphas at 0.87 for cognitive outcomes, 0.83 for social outcomes, and 0.83 for self-growth outcomes (Zhoc *et al.*, 2018). Additionally, there were two items asking about general grades for both online and in-person courses.

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Finally, the last section included typical demographic items including age, gender, race, and ethnicity. To reduce participant biases and avoid stereotype threat or related priming (Steele & Aronson, 1995), demographic questions were placed at the end of the survey.

Data analysis

All data was collected through Qualtrics and imported into SPSS Statistics version 25 (IBM Corp, 2017) for analysis. Data cleaning involved the removal of cases meeting the following criteria: 1) declined participation, 2) did not meet eligibility criteria, and 3) only responded to eligibility items or completed <10% of the survey. Missing data were handled in SPSS using pairwise and listwise deletion procedures, such that any case with a missing value on variables included in an analysis was omitted from that specific analysis. Demographic and educational information were analyzed using descriptive statistics. To examine the differences in student learning outcomes and satisfaction based on course format (online versus in-person), paired sample *t*-tests were used. To examine the relationships between ER, SDLBs, and sleep and learning outcomes/course satisfaction, correlational analyses were conducted.

Results

Learning outcomes and course satisfaction in online vs. in-person courses

The paired samples *t*-test showed that participants reported significantly better overall learning outcomes in their in-person courses (M = 104.15, SD = 9.0) compared to online courses (M = 97.24, SD = 9.9), t(158) = 7.97, $p < 0.001$, d = 0.63, 95% CI [0.46, 0.80] (see Figure 1). Participants reported significantly better cognitive learning outcomes in their in-person courses (M = 34.18, SD = 3.4) compared to online courses (M = 32.82, SD = 3.7), t (158) = 3.99, $p < 0.001$, d = 0.32, 95% CI [0.16, 0.48]. Similarly, participants reported significantly better social learning outcomes in their in-person courses (M = 34.92, SD = 3.6) compared to online courses (M = 30.43, SD = 4.3), t(158) = 11.41, $p < 0.001$, d = 0.91, 95% CI [0.72, 1.09]. and significantly better self-growth outcomes in their in-person courses (M = 35.05, SD = 3.2) compared to online courses (M = 34.00, SD = 4.0), t(158) = 3.22, $p < 0.001$, d = 0.26, 95% CI [0.10, 0.41].

Similar to the analyses examining learning outcomes, the paired samples *t*-test showed that, overall, participants reported significantly higher overall course satisfaction in their in-person courses compared to their online courses. Participants reported feeling significantly more satisfied with their in-person courses (M = 11.26, SD = 2.5) compared to their online courses (M = 9.95, SD = 3.0), t(158) = 4.48, $p < 0.001$, d = 0.36, 95% CI [0.19, 0.52] (see Figure 2).

Relationships between ER, SDLBs, and sleep on learning outcomes and course satisfaction

The exploratory correlation analyses showed several significant relationships between SDLBs and sleep on learning outcomes and satisfaction. For online courses (see Table 2), the SDLI

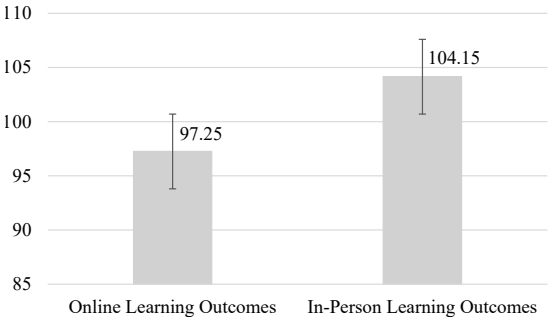

Figure 1. Learning outcomes in online vs. in-person coursesA bar graph comparing learning outcomes between online and in-person courses.

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Figure 2. Overall course satisfaction in online vs. in-person coursesA bar graph comparing online and in-person course satisfaction.

Table 2. Correlations between ER, SDLBs, and sleep with online and in-person course outcomes

Variable	1	2	3	4	5	6	7	8
1. DERS	–	−0.15*	0.62**	−0.11	−0.09	−0.07	−0.14	−0.15
2. SDLI	−0.15*	–	−0.26**	0.31**	0.27**	0.24**	0.33**	0.20**
3. GSAQ-9	0.62**	−0.26**	–	−0.00	−0.00	0.02	−0.03	−0.11
4. Overall learning outcomes	−0.10	0.28**	−0.10	–	0.89**	0.89**	0.87**	0.41**
5. Cognitive learning outcomes	−0.09	0.29**	−0.08	0.88**	–	0.69**	0.67**	0.43**
6. Social learning outcomes	−0.06	0.06	−0.05	0.80**	0.59**	–	0.66**	0.34**
7. Self-growth learning outcomes	−0.14	0.33**	−0.03	0.34**	0.28**	0.20**	–	0.32**
8. Overall satisfaction	−0.15	0.30**	−0.21**	0.54**	0.54**	0.34**	0.13	–

Note(s): Correlations for online courses are to the left of and below the diagonal; correlations for in-person courses are to the right of and above the diagonal
*$p < 0.05$, **$p < 0.001$

total scores were positive correlated with overall learning outcomes r(169) = 0.28, $p < 0.001$, 95% CI [0.13, 0.42], the cognitive learning outcomes, r(169) = 0.29, $p < 0.001$, 95% CI [0.14, 0.43], and self-growth learning outcomes, r(169) = 0.36, $p < 0.001$, 95% CI [0.22, 0.49]; interestingly, there was no significant relationship between SDLI scores and social learning outcomes. Overall course satisfaction for online courses was positively correlated with SDLI scores, r(169) = 0.30, $p < 0.001$, 95% CI [0.15, 0.44], and negatively correlated with GSAQ-9 scores, r(169) = −0.21, $p = 0.007$, 95% CI [−0.36, −0.06]. For in-person courses, SDLI total scores were significantly correlated with all of the learning outcomes, with positive correlations between SDLI scores and overall learning outcomes, r(169) = 0.31, $p < 0.001$, 95% CI [0.17, 0.44], cognitive learning outcomes, r(169) = 0.27, $p < 0.001$, 95% CI [0.13, 0.41], social learning outcomes, r(169) = 0.24, $p < 0.001$, 95% CI [0.09, 0.37], and self-growth learning outcomes, r(169) = 0.33, $p < 0.001$, 95% CI [0.18, 0.37] (Table 2). Additionally, SDLI scores were positively correlated with in-person course satisfaction, r(169) = 0.20, $p = 0.008$, 95% CI [0.05, 0.34]. Finally, while ER did show to be significantly related to SDLI, r(169) = −0.15, $p = 0.045$, 95% CI [−0.30, −0.003], and sleep, r(169) = 0.62, $p < 0.001$, 95% CI [0.51, 0.70], there were no correlations between ER and any of the learning outcomes or overall satisfaction for either online or in-person courses.

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Discussion

The present study explored differences in student learning outcomes and overall course satisfaction between online and in-person college courses, while also examining the relationships between key psychological and behavioral variables (ER, SDLBs, and sleep) with these outcomes. Overall, the study found that learning outcomes and satisfaction were better with in-person classes compared to online classes. Specifically, cognitive, social, and self-growth learning outcomes and course satisfaction were all significantly better for in-person courses than for online courses. Social learning outcomes showed the largest discrepancy between online vs. in-person courses, suggesting in-person courses may provide more opportunities for collaboration, discussion, and peer interaction. This is consistent with previous work emphasizing the value of social presence and real-time engagement in fostering meaningful learning (Richardson *et al.*, 2017). Similarly, students reported higher satisfaction with in-person courses, supporting existing literature that student preferences often lean toward traditional classroom settings, especially when opportunities for interpersonal connection and instructor feedback are emphasized (Faulconer *et al.*, 2018; Song, Singleton, Hill, & Koh, 2004).

To our knowledge, this study is the first to compare ER, SDLBs, and sleep in students taking online and in-person courses within a single study. Overall, results revealed that SDLBs were strongly correlated with both course satisfaction and student learning outcomes (specifically cognitive and self-growth) in both online and in-person courses, suggesting their broad relevance across modalities. Sleep was also related to course satisfaction in online learning, with better sleep associated with higher satisfaction. This aligns with existing findings linking sleep to cognitive function and academic performance (Okano *et al.*, 2019; Owens *et al.*, 2017) and highlights the potential for sleep to influence students' perceptions of their educational experience. Interestingly, ER did not show significant correlations with any learning outcomes or course satisfaction in either online or in-person courses, despite being correlated with both SDLBs ($p = 0.045$) and sleep ($p < 0.001$). These correlations suggest a meaningful pattern among the three variables. Students with poorer ER, reflecting increased emotion *dysregulation*, may experience poorer sleep quality, consistent with research linking difficulties managing negative affect to hyperarousal and sleep disturbance (Harvey, 2002). Compromised sleep may, in turn, reduce the cognitive resources and executive functioning needed for SDLBs (Doo, Zhu, & Bonk, 2023; Okano *et al.*, 2019). This positions ER as a potential leading factor whose influence on academic outcomes may operate indirectly through its effects on sleep and SDLBs rather than directly. Additionally, the measure used to assess ER was limited to emotional dysregulation; future research may benefit from using ER measures that focus on specific types of ER strategies most relevant in academic contexts (e.g. cognitive reappraisal, emotion suppression; Gross & John, 2003).

The study has several limitations to note. First, the sample may not be representative due to the recruitment measures, as students were recruited mostly from introductory psychology courses, which created a skewed demographic (e.g. younger age, primarily female). The sample likely underrepresents non-traditional students (e.g. working adults, parents, commuters) and first-generation college students, populations for whom online learning may offer distinct advantages in terms of flexibility and accessibility (Bright & Vogler, 2024; Long, Gebhardt, & McKenna, 2023). These groups may hold more positive orientations toward online learning than were captured here, limiting generalizability. Future studies should recruit more diverse samples across student backgrounds and institution types to address this gap.

A key limitation is that all online and in-person courses were each treated as a single category, regardless of instructional format. In reality, online courses range from fully asynchronous to synchronous and hybrid designs, while in-person courses vary from large lectures to small discussion-based classes. Collapsing across these subtypes may obscure meaningful variation in outcomes and satisfaction (Fabriz *et al.*, 2021; Ratan *et al.*, 2022). Future research should distinguish between delivery formats more precisely, at minimum

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separating synchronous and asynchronous online courses, and lecture-based versus activity-based in-person formats.

Beyond course format, several unexamined contextual factors may influence outcomes and satisfaction, including instructor experience with online pedagogy, discipline of study, students' linguistic backgrounds, assessment formats, and financial factors such as technology access (Long *et al.*, 2023; Martin & Borup, 2022). Future research should incorporate these variables to better clarify the conditions under which each modality supports student success. Another limitation was that the study relied on self-reported measures, which are subject to biased responses. Since participants were asked to reflect on past online and in-person courses, it is possible that they may have forgotten or misremembered specific course experiences, or perceptions of online courses may have been disproportionately influenced by a particularly negative experience in one online course (e.g. having a bad experience in one online course) or if the online learning experience was more negatively-emotionally charged (e.g. during the COVID-19 pandemic). Additionally, some of the participants had never taken online classes, so their survey results were used for descriptives and demographics but were not included in the paired samples *t*-test when comparing outcomes and satisfaction between the two course types. Furthermore, the exclusive use of close-ended, quantitative survey items enabled this research to examine how satisfaction and learning outcomes vary by course format, yet it provided limited insight into why these differences occur. For example, while in-person students reported higher satisfaction, it is not possible from the current data to determine whether this reflects preferences for face-to-face social interaction, real-time instructor feedback, perceived course rigor, or other qualitative dimensions of the classroom experience. Future research would benefit from incorporating qualitative or mixed-methods approaches to data collection, objective measures of learning outcomes, such as course grades, instructor evaluations, or performance-based assessments, alongside self-reports of learning outcomes to reduce potential bias.

The findings carry several practical implications for instructors and course designers. First, the large gap in social learning outcomes suggests that online courses should prioritize structured peer interaction through synchronous discussions, collaborative assignments, and active discussion boards (Martin & Borup, 2022; Ratan *et al.*, 2022). Second, given the strong association between SDLBs and outcomes across both modalities, online instructors should consider explicitly scaffolding self-directed learning skills through goal-setting prompts, self-monitoring checklists, and orientation activities focused on time management (Doo *et al.*, 2023; Zhu, Berri, Koda, & Wu, 2024). Third, because sleep quality was associated with satisfaction in online courses specifically, advisors should encourage students in asynchronous courses to maintain consistent study routines, and institutions could incorporate sleep health information into online orientations. Together, these strategies suggest that the gap between online and in-person outcomes may be partially addressed through intentional course design and student support.

Overall, the results demonstrate the benefits of in-person learning for college students compared to online courses. The findings indicate that face-to-face interactions and the immediate feedback provided in traditional classroom settings contribute significantly to higher levels of student engagement and academic performance. Although online courses offer greater flexibility and accessibility, future research should investigate additional factors influencing students' decisions to enroll in either format. Specifically, examining students' dispositional attributes such as motivation, and possible biomarkers, may provide more insight into how these characteristics impact their choice of course format. Furthermore, understanding how these attributes affect course satisfaction levels and overall student outcomes could inform the development of more effective online learning environments. This understanding is essential for optimizing educational strategies and ensuring that all students receive the support they need, regardless of the mode of instruction. By highlighting the factors influencing student satisfaction and academic achievement in different instructional formats, this research provides valuable insights for educators and institutional course designers.

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Understanding these dynamics can allow instructors to optimize their teaching strategies and courses to better meet the needs of online learners so their outcomes are better aligned with in-person students. By tailoring courses to enhance the student experience, instructors can foster a more supportive and effective learning environment, even in online courses.

References

Alarifi, B. N., & Song, S. (2024). Online vs in-person learning in higher education: Effects on student achievement and recommendations for leadership. *Humanities and Social Sciences Communications*, *11*(86), 1–8. doi: 10.1057/s41599-023-02590-1.

Andrés, M. L., Stelzer, F., Canet Juric, L., Introzzi, I. M., Rodríguez Carvajal, R., & Navarro Guzmán, J. I. (2017). Emotion regulation and academic performance: A systematic review of empirical relationships. *Psicologia em Estudo*, *22*(3), 299–311. doi: 10.4025/psicolestud.v22i3.34360.

Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting standards for quantitative research in psychology: The APA Publications and Communications Board task force report. *American Psychologist*, *73*(1), 3–25. doi: 10.1037/amp0000191.

Bright, K., & Vogler, J. S. (2024). Learning online vs. learning in person: A mixed-methods approach to understanding how student preferences and perceptions have evolved since the pandemic. *Online Learning*, *28*(4), 56–78. doi: 10.24059/olj.v28i4.4565.

Bytamar, J. M., Saed, O., & Khakpoor, S. (2020). Emotion regulation difficulties and academic procrastination. *Frontiers in Psychology*, *11*, 524588. doi: 10.3389/fpsyg.2020.524588.

Callister, R. R., & Love, M. S. (2016). A comparison of learning outcomes in skills-based courses: Online versus face-to-face formats. *Decision Sciences Journal of Innovative Education*, *14*(2), 243–256. doi: 10.1111/dsji.12093.

Cavanaugh, J., & Jacquemin, S. J. (2015). A large sample comparison of grade based student learning outcomes in online vs. face-to-face courses. *Online Learning*, *19*(2), 1–8. doi: 10.24059/olj.v19i2.454.

Cheng, S. -F., Kuo, C. -L., Lin, K. -C., & Lee-Hsieh, J. (2010). Development and preliminary testing of a self-rating instrument to measure self-directed learning ability of nursing students. *International Journal of Nursing Studies*, *47*(9), 1152–1158. doi: 10.1016/j.ijnurstu.2010.02.002.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. doi: 10.1177/004723952093401.

Doo, M. Y., Zhu, M., & Bonk, C. J. (2023). Influence of self-directed learning on learning outcomes in MOOCs: A meta-analysis. *Distance Education*, *44*(1), 86–105. doi: 10.1080/01587919.2022.2155618.

Erdfelder, E., Faul, F., & Buchner, A. (1996). Gpower: A general power analysis program. *Behavior Research Methods, Instruments, and Computers*, *28*, 1–11. doi: 10.3758/BF03203630.

Fabriz, S., Mendzheritskaya, J., & Stehle, S. (2021). Impact of synchronous and asynchronous settings of online teaching and learning in higher education on students' learning experience during COVID-19. *Frontiers in Psychology*, *12*, 733554. doi: 10.3389/fpsyg.2021.733554.

Faulconer, E. K., Griffith, J., Wood, B., Acharyya, S., & Roberts, D. (2018). A comparison of online, video synchronous, and traditional learning modes for an introductory undergraduate physics course. *Journal of Science Education and Technology*, *27*(5), 404–411. doi: 10.1007/s10956-018-9732-6.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362. doi: 10.1037/0022-3514.85.2.348.

Hari Rajan, M., Herbert, C., & Polly, P. (2024). Disrupted student engagement and motivation: Observations from online and face-to-face university learning environments. *Frontiers in Education*, *8*, 1320822. doi: 10.3389/feduc.2023.1320822.

Downloaded from http://ftp.nowpublishers.com/qrde/article-pdf/27/2/194/11614462/qrde-01-2026-0003en.pdf by guest on 22 July 2026

Harvey, A. G. (2002). A cognitive model of insomnia. *Behaviour Research and Therapy*, *40*(8), 869–893. doi: 10.1016/S0005-7967(01)00061-4.

IBM. (2017). *IBM SPSS Statistics for windows, version 25*. Armonk, NY: IBM SPSS Corp.

Johnson, S. D., Aragon, S. R., & Shaik, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research*, *11*(1), 29–49.

Kaba, A., Eletter, S., ElRefae, G. A., Alshehadeh, A. R., & Al-Khawaja, H. A. (2024). Students' academic performance before, during, and after COVID-19 in F2F and OL learning: The impact of gender and academic majors. *International Journal of Data and Network Science*, *8*, 667–678. doi: 10.5267/j.ijdns.2024.1.011.

Kaufman, E. A., Xia, M., Fosco, G., Yaptangco, M., Skidmore, C. R., & Crowell, S. E. (2016). The difficulties in emotion regulation scale Short Form (DERS-SF): Validation and replication in adolescent and adult samples. *Journal of Psychopathology and Behavioral Assessment*, *38*(3), 443–455. doi: 10.1007/s10862-015-9529-3.

Long, M. G., Gebhardt, K., & McKenna, K. (2023). Success rate disparities between online and face-to-face economics courses: Understanding the impacts of student affiliation and course modality. *Online Learning*, *27*(4), 461–485.

Martin, F., & Borup, J. (2022). Online learner engagement: Conceptual definitions, research themes, and supportive practices. *Educational Psychologist*, *57*(3), 162–177. doi: 10.1080/00461520.2022.2089147.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies, U.S. Department of Education. Available from: http://www.ed.gov/about/offices/list/opepd/ppss/reports.html

Okano, K., Kaczmarzyk, J. R., Dave, N., Gabrieli, J. D., & Grossman, J. C. (2019). Sleep quality, duration, and consistency are associated with better academic performance in college students. *npj Science of Learning*, *4*(1), 16–21. doi: 10.1038/s41539-019-0055-z.

Owens, H., Christian, B., & Polivka, B. (2017). Sleep behaviors in traditional-age college students: A state of the science review with implications for practice. *Journal of the American Association of Nurse Practitioners*, *29*(11), 695–703. doi: 10.1002/2327-6924.12520.

Özer, D., Altun, Ö. Ş., & Avşar, G. (2023). Investigation of the relationship between internet addiction, communication skills and difficulties in emotion regulation in nursing students. *Archives of Psychiatric Nursing*, *42*, 18–24. doi: 10.1016/j.apnu.2022.12.004.

Ratan, R., Ucha, C., Lei, Y., Lim, C., Triwibowo, W., Yelon, S., . . ., & Chen, V. H. H. (2022). How do social presence and active learning in synchronous and asynchronous online classes relate to students' perceived course gains?. *Computers & Education*, *191*, 104621. doi: 10.1016/j.compedu.2022.104621.

Richardson, J. C., Maeda, Y., Lv, J., & Caskurlu, S. (2017). Social presence in relation to students' satisfaction and learning in the online environment: A meta-analysis. *Computers in Human Behavior*, *71*, 402–417. doi: 10.1016/j.chb.2017.02.001.

Roth, T., Zammit, G., Kushida, C., Doghramji, K., Mathias, S. D., Wong, J. M., & Buysse, D. J. (2002). A new questionnaire to detect sleep disorders. *Sleep Medicine*, *3*(2), 99–108. doi: 10.1016/s1389-9457(01)00131-9.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The Internet and Higher Education*, *7*(1), 59–70. doi: 10.1016/j.iheduc.2003.11.003.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, *69*(5), 797–811. doi: 10.1037//0022-3514.69.5.797.

Xing, X., & Saghaian, S. (2022). Learning outcomes of a hybrid online virtual classroom and in-person traditional classroom during the COVID-19 pandemic. *Sustainability*, *14*(9), 5263–5277. doi: 10.3390/su14095263.

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Xu, D., & Jaggars, S. S. (2013). The impact of online learning on students' course outcomes: Evidence from a large community and technical college system. *Economics of Education Review*, *37*, 46–57. doi: 10.1016/j.econedurev.2013.08.001.

Zhoc, K. C., Chung, T. S., & King, R. B. (2018). Emotional intelligence (EI) and self-directed learning: Examining their relation and contribution to better student learning outcomes in higher education. *British Educational Research Journal*, *44*(6), 982–1004. doi: 10.1002/berj.3472.

Zhu, M., Berri, S., Koda, R., & Wu, Y. J. (2024). Exploring students' self-directed learning strategies and satisfaction in online learning. *Education and Information Technologies*, *29*(3), 2787–2803. doi: 10.1007/s10639-023-11914-2.

Corresponding author
Kelly E. Ferreira can be contacted at: kelly.ferreira@trincoll.edu

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