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Counseling Services' Impacts on College Students in STEM Majors: Comparison between Engineering and Non-Engineering Students

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Abstract

During the COVID-19 pandemic, emotional loneliness, insomnia, and stress are specific common psychological reactions reported by college students. In addition, remote learning environments, due to the COVID-19 pandemic, are becoming more and more popular even after the pandemic. Many college students faced this change without a familiar routine and support to provide a sense of stability and coherence. Commonly observed effects of such reactions and changes on college students include drugs and alcohol use, anxiety, depression, acute stress, and low academic motivation leading to a drop in attendance and retention. However, there appear to be some differences regarding the utilization of mental health services among college students. Several factors contribute to the underutilization of mental health services, such as inability to recognize the need for services, cost of services, to name a few. In addition, many college campuses are not sufficiently equipped to support students' growing mental health needs. University counseling centers nationwide are struggling to cope with this increase demand for their services. With the support from the U.S. Department of Education, the authors implemented a collaborative program between academic units and university counseling services to provide mental wellness training to minority students in STEM majors in the last three years at Texas A&M University-Kingsville. STEM students were recruited to participate in the program to completed a set of mental wellness activities or training. The psychological measure, titled the Counseling Center Assessment of Psychological Symptoms (CCAPS), was used to measure students' mental readiness before and after they completed the mental wellness program. CCAPS is a multidimensional instrument that covers a variety of psychological conditions, including Depression, Generalized Anxiety, Social Anxiety, Academic Distress, Eating Concerns, Family Distress, Hostility, and Substance/Alcohol use. Therefore, CCAPS is efficient and cost-effective. More important, the instrument is specifically normed for the college student population and has strong psychometric properties. The CCAPS results showed significant changes on several psychological conditions after students completed the mental wellness program. In this paper, the authors will first discuss the detailed design and implementation of the mental wellness program. Then, the pre- and post- CCAPS results from more than 50 students will be reported. In addition, the academic performance of these students, including their GPAs, retention rate, academic progress or graduation timeline, will be analyzed together with their CCAPS results. The authors will specifically compare the analysis results between Engineering students and Non-Engineering students to discover any noticeable patterns.

Project Background

The COVID-19 pandemic has caused significant disruption on the teaching and learning styles at Texas A&M University-Kingsville and across the nation. Many college students faced this disruption without a familiar routine and support to provide a sense of stability and coherence. The risks are especially critical for first-generation students, most of whom also experience a precipitous decrease in previously existing scaffolds of social support and networks [1],[2]. Their need for mental health services is not being met [3]. The speed with which the pandemic has developed, the extent of the governmental and educational mitigation strategies,

and the ongoing nature of the threat make this a unique experience. Emotional loneliness, insomnia, and stress were specific common psychological reactions reported during the pandemic [4],[5]. Commonly observed effects of such experiences on college students include drugs and alcohol use, anxiety, depression, acute stress, and low academic motivation leading to a drop in attendance and retention [6]. The perceived level of personal disruption of the pandemic was closely tied to worse psychological outcomes. Since the majority of Texas A&M University-Kingsville students are Hispanic and first-generation college students and/or in the low-income category, the disruption of COVID-19 on their academic and overall functioning is much more severe. The difficulties, such as increased needs on child and elderly care due to school closures and reduced family income due to job losses, significantly increasing their need for mental health support.

However, there appear to be differences in the ways that college students from various backgrounds utilize mental health services. First-generation college students report a significant reduction in their utilization of mental health services on college campuses [7]. Several factors contribute to the underutilization of mental health services, inability to recognize the need for services [7], and cost of services [8] to name a few. In addition, many college campuses are not sufficiently equipped to support students' growing mental health needs [9]. University counseling centers nationwide are struggling to cope with this increase demand for their services [10]. Increasing resources for unplanned mental health services can be costly and impractical, given the budget crisis facing many university [11]. With limited resources, the Texas A&M University-Kingsville Student Health and Wellness Center is hardly well positioned to provide for the post-pandemic mental wellness services remotely or in-person. The paucity of mental wellness resources underscores the critical need to shore up existing resources by identifying cost-effective ways to meet the growing mental health needs of college students [12].

Faculty and students are recognized as viable referral agents for recognizing and referring students to the counseling centers and other resources for mental health disorders [13]. Thus, faculty play vital roles in supporting college student mental health, including as viable referral agents to recognize and refer students to resources [9],[13],[14]. However, a large percentage of students and faculty feel unprepared to recognize warning signs of mental distress [9], suggesting that campuses are ill-equipped to assist low-income, first-generation, and racially minority college students' persistence to graduation [15], particularly in a post-COVID-19 pandemic world. Consequently, there exists a strong need for cost-effective methods to educate students and faculty and increase their awareness of students' mental health and the associated warning signs.

Program Design

The Mental Wellness and Readiness Preparation (MWRP) program was part of a grant funded by the U.S. Department of Education, which consisted of two major components. a) Promote mental awareness and training modules to students through workshops and financial support. b) Promote mental awareness and readiness awareness and knowledge to faculty through workshops and the Virtual Community of Practice.

Texas A&M University-Kingsville students are struggling with learning loss, increased stress, lack of social connections, decreased confidence, insecurity, feeling disconnected, and more. With their learning and mental health severely impacted, it can be difficult to see a clear path forward, let alone for their future. The MWRP program integrated, enhanced, and promoted

different available resources in Texas A&M University-Kingsville campus to provide monthly campus-wide mental wellness training workshops to minority students. The MWRP program targeted several psychological conditions and used the psychological measure titled, the Counseling Center Assessment of Psychological Symptoms (CCAPS) to measure students' mental readiness. The CCAPS is a standardized, multidimensional self-report instrument designed specifically for use in university and college counseling settings that covers a variety of psychological conditions, including Depression (e.g., sadness, lack of energy), Generalized Anxiety (e.g., worry, panic), Social Anxiety (e.g., discomfort around others), Academic Distress (e.g., motivation, concentration), Eating Concerns (e.g., body image, food obsession), Family Distress (e.g., tension at home), Frustration/Anger (e.g., irritability, rage), and Substance use (e.g., alcohol/drug use). It was developed to provide an efficient method for assessing a broad range of mental health concerns commonly experienced by college students. The instrument is administered as an online self-report questionnaire, completed directly by students, rather than being delivered by a clinician through interview or observation. This digital, self-administered format is central to its design, allowing counseling centers to incorporate it easily into routine intake procedures, progress monitoring, and outcome assessment [16]. The CCAPS is available in two primary forms: the CCAPS 62, a 62-item comprehensive measure, and the shorter CCAPS 34, each containing multiple subscales that assess key clinical domains such as depression, generalized anxiety, social anxiety, eating concerns, academic distress, family distress, and substance use. The CCAPS 62, in particular, was created for use at initial intake and at post treatment due to its broader content coverage, strong psychometric properties, and utility in documenting change over time. Both versions were developed using large national student samples and are continually updated with new normative data to ensure applicability across diverse university populations [16].

Because students complete the CCAPS independently online, the measure supports efficient large-scale screening while maintaining strong validity and reliability, as documented in multiple psychometric evaluations. The self-report format also allows institutions to integrate CCAPS data into electronic health record systems and to provide immediate clinical feedback to practitioners [17]. CCAPS is an easy-to-read (9th-grade reading level for college students) multidimensional inventory. For each subscale, the mean score is used for evaluation. Higher scores reflect higher levels of distress or symptoms to aid clinical and research.

The MWRP program also worked closely with Texas A&M University-Kingsville Student Health and Wellness Center to promote their Counseling Services campus wide. Texas A&M University-Kingsville Student Health and Wellness Center currently provides professional psychological services directed towards assisting students in realizing, developing, and reaching their personal potential in order for them to be successful in their occupational role of being a student. All the Counseling Services are free to Texas A&M University-Kingsville students, and are offered both face-to-face and Tele-Mental Health counseling appointments through the HIPAA secure platform ZOOM. However, the number of students participated in these services were very low compared to the total enrollment, especially minority students in STEM major. One of the reasons was lack of resources to promote these services campus-wide. The MWRP program developed partnerships with student affairs practitioners and student services across campus to help promote awareness of mental health options for students (i.e., new student orientation, career services, academic advising, student clubs, and multicultural student affairs, etc.). The MWRP program organized monthly campus-wide workshops to promote all of the available services, and work with the Office of Student Success to connect students with the

resources needed. The MWRP program also organized mini workshops in Texas A&M University-Kingsville residential halls in a casual and informal setting to attract more students to attend the training. Different social media were used to promote and create mental wellness and readiness awareness at Texas A&M University-Kingsville.

Graduate students from Psychology program were hired to help MWRP Coordinator with these activities. Finally, with the support of the U.S. Department of Education grant, the MWRP project offered a $100 to $150 stipend to each student who complete at least 10-hour training from the following list: 1) CCAPS; 2) POWER: Positive Opportunities for Wellness and Emotional Resiliency Program; 3) DAAPP: Drug and Alcohol Prevention Program; 4) Relaxing Moment; 5) QPR: Question, Persuade, Refer; 6) Let's Tele-Talk Tuesdays; 7) Tele-Mental Health services; 8) Monthly Workshops, and 9) Mini workshops in residential halls.

In addition, the MWRP Coordinator worked closely with Texas A&M University-Kingsville Student Health and Wellness Center to offer workshops to faculty members on mental health issues, identifying students' mental health warning signs, and how to access mental health services on campus. The MWRP program also reached out to faculty who might serve as allies for the MWRP program, visited classrooms, and partner with programs such as TRiO with a high enrollment of first-generation students.

Program Evaluation and Assessment Results

We received a total of 60 students' pre- and post-administration results of the CCAPS in the last three years. We also conducted follow-up administration of the CCAPS with 28 out of the 60 students about 3-4 weeks after the students completed the 10-hour MWRP program. Table 1 summarize the average scores of students' CCAPS results. Among the 60 students, there are 28 students in Engineering and Computer Science majors with 10 of them completed the follow-up CCAPS. Table 1 summarizes the average scores of CCAPS results for the students. The average scores of pre-survey are similar to the national level, however, the change/improvement between pre- and post-surveys are much higher compared to the national level. The measured areas are evaluated by the students' answers to 62 items/questions in the CCAPS [16], which covers a variety of psychological conditions usually encountered by college students, including depression (13 items; e.g., I feel worthless), generalized anxiety (9 items; e.g., I have spells of terror or panic), social anxiety (7 items; e.g., I feel uncomfortable around people I do not know), academic distress (5 items; e.g., It is hard to stay motivated for my classes), eating concerns (9 items; e.g., I feel out of control when I eat), family distress (6 items; e.g., I wish my family got along better), Frustration/Anger(7 items; e.g., I have difficulty controlling my temper, and substance/alcohol use (6 items, e.g., I drink alcohol frequently). CCAPS-62 yields an overall Distress Index (DI) that comprises 19 items drawn from all the scales except eating concerns and family distress. Some examples of the measured areas are listed below:

- Depression: (e.g., sadness, lack of energy)
- Generalized Anxiety: (e.g., worry, panic)
- Social Anxiety: (e.g., discomfort around others)
- Academic Distress: (e.g., motivation, concentration)
- Eating Concerns: (e.g., body image, food obsession)
- Family Distress: (e.g., tension at home)
- Frustration/Anger: (e.g., irritability, rage)
- Substance Use: (e.g., alcohol/drug use)

Table 1: Summary of the Average Scores of CCAPS Results

Measured Areas	Pre			Post			Follow-up		
	T	E	N	T	E	N	T	E	N
Depression	36.05	43.39	36.41	18.52	21.30	19.41	19.18	24.10	16.44
Generalized Anxiety	43.03	44.26	48.88	26.33	28.65	28.78	23.32	23.50	23.22
Social Anxiety	52.17	58.70	55.63	41.00	43.22	45.81	41.04	42.60	40.17
Academic Distress	45.85	53.48	47.53	33.17	37.96	34.91	23.68	22.90	24.11
Eating Concerns	60.22	71.65	61.41	50.50	62.91	49.47	43.54	52.20	38.72
Frustration/Anger	47.18	49.13	53.16	32.55	33.30	37.09	34.25	35.50	33.56
Family Distress	51.42	50.13	60.38	41.63	40.48	48.97	40.43	38.40	41.56
Substance Use	49.50	50.74	56.34	45.85	46.30	52.69	39.68	38.10	40.56
Distress Index	36.75	43.74	37.47	19.95	23.74	20.34	18.11	19.10	17.56

(note: T: Total, E: Engineering/Computer Science, N: Non-Engineering/Computer Science)

A quick review of the comparison of the pre- and post-average scores shows a trend toward reduced posttreatment symptoms across all measured areas of psychological concerns for all the students no matter they are in Engineering or not. After the brief intervention, participants' average scores trend in the direction of reduced symptoms, specifically for Depression, Generalized Anxiety, and Social Anxiety Disorders.

After 3-4 weeks of the completion of the MWRP program, the average scores of most measured areas continued to decrease (except Depression, Frustration/Anger) for all the students, showing the sustained impacts on reducing posttreatment symptoms. And the increases on the average scores of social anxiety and frustration/anger are minimal, which could be considered as staying the same. However, looking at Engineering/Computer Science students only, their average scores of Depression and Frustration/Anger increased, while non-Engineering students' follow-up results did not. It may indicate that Engineering/Computer Science studies pose higher risk to students' mental wellness compared to non-Engineering majors.

Table 2: Summary of the Reduced Percentages of Average Scores of CCAPS Results

Measured Areas	Post to Pre			Follow-up to Pre			Follow-up to Post		
	T	E	N	T	E	N	T	E	N
Depression	48.64	50.90	46.70	46.80	44.46	54.83	-3.57	-13.12	15.26
Generalized Anxiety	38.81	35.27	41.11	45.81	46.91	52.49	11.44	17.98	19.31
Social Anxiety	21.41	26.37	17.64	21.34	27.42	27.79	-0.09	1.43	12.32
Academic Distress	27.66	29.02	26.56	48.36	57.18	49.27	28.61	39.67	30.93
Eating Concerns	16.14	12.20	19.44	27.70	27.15	36.94	13.79	17.03	21.72
Frustration/Anger	31.01	32.21	30.22	27.41	27.74	36.87	-5.22	-6.59	9.54
Family Distress	19.03	19.25	18.89	21.37	23.40	31.17	2.89	5.13	15.14
Substance Use	7.37	8.74	6.49	19.84	24.91	28.02	13.46	17.72	23.03
Distress Index	45.71	45.73	45.70	50.73	56.33	53.15	9.24	19.54	13.71

(note: T: Total, E: Engineering/Computer Science, N: Non-Engineering/Computer Science, numbers in percentage, positive means decrease while negative means increase)

Table 2 shows the percentage changes of the CCAPS results in each measured area. In majority of the measured areas, the percentage changes (reduction) are higher for Engineering

students compared to non-engineering students, which indicates the importance of offering mental wellness programs to engineering students.

Lessons Learned and Continuous Improvements

The COVID-19 pandemic caused significant disruption and impacted the education of college students across the U.S., making their pathway to graduation less specific, particularly for students in STEM fields. The consensus among education experts is that the U.S. is losing potential STEM talents at various stages of its education system. In the ensuing post-pandemic world, STEM students lack the psychological support needed to navigate their career goals and gain the experiences to foster a successful career upon graduation. Creating psychological support for students emerging from the COVID-19 pandemic is imperative, as appropriate interventions can assist students while boosting campus retention efforts. Thus, producing sufficient numbers of graduates who are prepared for STEM occupations becomes a national priority. As an intervention program, the MWRP program offered students to participate in six structured developmentally and culturally appropriate intervention protocol sessions.

Meanwhile, with increasing budget constraints university counseling centers are faced with making some tough decisions, collaboration with other university offices and branches brought significant improvements on the quality of services in mental wellness at Texas A&M University-Kingsville. The results of the pre and post-administration of the CCAPS show great promise as trends show movement toward reduced symptoms of psychological conditions.

Students' voices, insights, and preferences are crucial to the intervention protocol as communicated by participants in the sessions. To increase the awareness of mental wellness and available resources related to mental wellness are critical for improving college students' mental wellness.

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References

[1] Brewin, C.R., Andrews, B., & Valentine, J.D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. Journal of Consulting and Clinical Psychology, 68(5), 748– 766. doi:10.1037//0022-006x.68.5.748

[2] Leodoro, J. L., Alexis, J., Santos, E., & Falguera, C. C. (2021). Social and emotional loneliness among college students during the COVID-19 pandemic: The predictive role of coping, behaviors, social support, and personal resilience, Perspectives in Psychiatric Care, 57 (1), 2-7 doi:10.1111/ppc.12721

[3] Stebleton, M. J., Soria, K. M., Huesman, R. L. (2014). First-generation students' sense of belonging, mental health, and use of counseling services at public research universities. Journal of college counseling, 17 (1) 6-20. https://doi.org/10.1002/j.2161-1882.2014.00044.x

[4] Morin, C. M., & Carrier, J. (2020). The acute effects of the COVID-19 pandemic on insomnia and psychological symptoms. Sleep Medicine, 77(1) 346-347. https://doi.org/10.1016/j.sleep.2020.06.005
[5] Morin, C. M., Carrier, J., Bastien, C., Godbout, R., Canadian, S.., & Circadian, N. (2020). Sleep and circadian rhythm in response to the COVID-19 pandemic. Canadian Journal of Public Health, 111(5), 654– 657. https://doi.org/10.17269/s41997-020-00382-7
[6] Gibbons, M. M., & Woodside, M (2014). Addressing the needs of first-generation college students: Lessons learned from adults from low-education families. Journal of College Counseling, 17 (1), 21-36. https://doi.org/10.1002/j.2161-1882.2014.00045.x
[7] Rosenthal, B. S., & Wilson, W. C. (2016). Psychosocial dynamics of college students' use of mental health services. Journal of College Counseling, 19(3), 194–204. doi:10.1002/jocc.12043
[8] Marsh, C. N., & Wilcoxon, S. A. (2015). Underutilization of mental health services among college students: An examination of system-related barriers. Journal of College Student Psychotherapy, 29(3), 227–243. doi:10.1080/87568225.2015.1045783
[9] Albright, G., & Schwartz, V. (2017). Are campuses ready to support students in distress? Retrieved from the JED Foundation website at https://www.jedfoundation.org/wpcontent/uploads/2017/10/Kognito-JED-Are-Campuses-Ready-to-Support-Studentsin-Distress.pdf
[10] Gallagher, R., & Taylor, R. (2015). National survey of counseling center directors, (Series No. 9V). Alexandria, VA: International Association of Counseling Services.
[11] Kraft, D. P. (2009). Mens sana: The growth of mental health in the American College Health Association. Journal of American College Health, 58(3), 267–275. doi:10.1080/07448480903297546
[12] Brunner, J. L., Wallace, D. L., Reymann, L. S., Sellers, J., & McCabe, A. G. (2014). College counseling today: Contemporary students and how counseling centers meet their needs. Journal of College Student Psychotherapy, 28(4), 257–324. doi:10.1080/87568225.2014.948770
[13] Kalkbrenner, M. T. (2016). Recognizing and supporting students with mental disorders: The REDFLAGS model. Journal of Education and Training, 3(1), 1–13. doi:10.5296/jet.v3i1.814
[14] White, S., Park, Y. S., Israel, T., & Cordero, E. D. (2009). Longitudinal evaluation of peer health education on a college campus: Impact on health behaviors. Journal of American College Health, 57, (5) 497–505. doi:10.3200/JACH.57.5.497-506
[15] Cahalan, M., Perna, L. W., Yamashita, M., Wright, J., & Santillan, S. (2018). 2018 Indicators of higher education equity in the United States: Historical trend report. The Pell Institute for the Study of Opportunity in Higher Education, Council for Opportunity in Education (COE), and Alliance for Higher Education and Democracy of the University of Pennsylvania. http://pellinstitute.org/downloads/publications-Indicators_of_Higher_Education_Equity_in_the_US_2019_Historical_Trend_Report.pdf
[16] https://ccmh.psu.edu/ccaps-34-62, accessed on 04/01/2026.
[17] Youn, S. J., et al. (2015). The Counseling Center Assessment of Psychological Symptoms (CCAPS): Merging clinical practice, training, and research. *Psychotherapy*, *52*(4), 432.