

First Year University Students Self-Reported Health Outcomes Over an Academic Semester

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Abstract

The transition to university can be a stressful time in a student's life. Recent evidence demonstrates declining mental and physical health in college and university students compared to the general public. A prospective cohort study investigating mental and physical wellness over the course of a semester in a sample of first-year undergraduate students (N=74; 65%F) from nine faculties was completed at a large university in Canada. Sixty-eight (92%) students with a mean (SD, \pm) age 18.2 ± 1.1 yrs., weight 67.9 ± 15.5 kg, height, 168.5 ± 11.6 cm and waist circumference 81.3 ± 9.8 cm completed the SF-36v₂ quality of life questionnaire at the beginning and end of the semester in Fall 2014. A decrease in vitality ($p=0.003$), social functioning ($p=0.004$), emotional state ($p=0.014$), and mental health ($p=0.019$) outcomes as measured by the SF-36v₂ occurred during the semester. In addition, aggregate mental health significantly declined from the beginning to the end of the semester ($p < 0.001$), while physical health did not change ($p=0.242$). The importance of promoting and increasing awareness of campus wide mental health strategies should be considered a priority for first year undergrad students. Particularly, because students in their first year may take longer than one semester to adjust to the increased work load and although difficult to speculate it is possible that both mental and physical health would decline over the next (second) semester. Future research should aim for longer study duration.

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Introduction

Many young adults (age 17-19) move away from home for the first time to attend university. This transitional period from high school into a student's first (freshman) year introduces an increase in psychological autonomy related to making their own independent decisions.¹ Students are thus faced with challenges that require adapting to an environment with new rules and higher academic workload. These challenges bring new stressors which could influence their self-perceived health which is the subjective perception of how healthy mentally and physically a person feels.² An individual may not even be aware of any physical changes but simply just does not feel well. The current report from the Center for Collegiate Mental Health (2018) states that nearly 1 in 5 university students are affected by feelings of anxiety and/or depression.³

The incidence of depression in undergraduate university students is a growing concern, both in Canada (37.5%) and the USA (33.2%).⁴ Undergraduate students self-reported (2013) that they had difficulty functioning at points during their academic year because of depression.⁴ While this statistic may be surprising, most studies have shown about 75% of all life-long mental illnesses emerge by a person's mid-twenties⁵ and students in undergraduate university studies are typically between the ages of 18 to 25. Students who are depressed can experience up to half a letter grade drop in grade point average (GPA) and have an increased likelihood of dropping out.^{6,7}

This information is not entirely new; the link between mental illness and academic difficulty in college has been supported by the literature for the past twenty years. Kessler et al. (2007), estimated that 7.2 million people in the United States were unable to finish college because of an early onset psychiatric disorder.⁵ Despite, efforts within the last ten years to make mental health a priority in most universities Eisenberg et al., (2009), states that about 39% of students with the highest level of depression had not received any professional help.⁷ Garlow, Rosenberg, Moore et al. found even more unfavourable results with 85% of undergraduate students with moderate to severe depression not receiving any counselling or psychiatric treatment (2008).⁸

On-campus counselling services at many universities across North America have seen an increase in the number of students accessing mental health services in addition to an increase in the severity of problems reported by students.⁹ Prior to 1994, counselling services across the United States cited relationship problems as being the most common reason university students attended counselling. In the years following 1994, the most common reason students attended counselling was to receive help coping with stress and anxiety. Since 1994, the number of depressed students has also doubled, and the number of students feeling suicidal has tripled.⁹ This is a cause for concern now and in the future, especially since the European Commission, in September of 2004, predicted a 50% increase in diagnosed mental disorders across the globe by the year 2020.¹⁰

Not only is mental health a very big concern on university campuses but students are largely unprepared to cope with their changing stress levels. First year university seems to be the most critical time for adaptation because of the numbers of stressors it can generate. Therefore, an ideal time to educate students regarding mental and physical wellness is in their first semester when they are beginning to feel overwhelmed or anxious but not aware of any physical symptoms. The study purpose was to measure the mental and physical wellness of first year undergraduate students over the course of the fall semester using a quality of life questionnaire in a large university in western Canada.

Methods

This study was a subset of a larger prospective study called Recreation Exercise Caloric Expenditure Sitting and Sleep study in first-year university students (RECESS). The RECESS study employed several questionnaires, which measured: energy expenditure, sitting time, physical activity intensity, and general wellness in a sample of undergraduate students during the fall semester of their first year. The sample size (N=105) for the RECESS study was powered on weight change at an alpha level of 0.05. The study was granted institutional ethical approval and written informed consent was obtained before the data collection began.

Recruitment

Incoming first year undergraduate students were recruited during orientation week through posters and word of mouth at various orientation locations across faculties at a Canadian university. Study participants contacted the study team via email to enroll. The inclusion criteria required students to be entering university for the first time without a gap in their transition from high school to graduation and to be enrolled in full time studies. The students (N=74) represented nine faculties: arts (10, 12.2%), business (5, 6.8%), education (1, 1.4%), engineering (6, 8.1%), health sciences (1, 1.4%), kinesiology (42, 57%), medicine (2, 2.7%), nursing (2, 2.7%), and science (6, 8.1%).

Measures

Data collection occurred twice in the fall semester of 2014; the first from September 17th to 24th (pretest or baseline measurements) and the second occurred from December 10th to 19th (post-test or follow-up measurements; 11-12-week duration). Testing required a duration of 60-75 minutes to complete the three biometric measurements (height, wall mounted stadiometer; weight, Tanita BF 350 scale; and waist circumference, tape measure) as part of the larger study and the survey questionnaires. In this paper, we report only on the SF-36v₂ questionnaire.¹¹

Mental and Physical Wellness Questionnaire

The SF-36 is a 36-item generic questionnaire originally developed by the Boston Health Research Institute in the United States and was designed to assess overall health status of members of the general population aged 14 years or over.¹¹ The questionnaire provides a direct quantitative indication of an individual's health status and has become the most widely-used Quality of Life (QOL) evaluation tool in the world according to Zhang et al., (2012).¹² The reliability and validity of the SF-36 questionnaire has been evaluated in a number of specific populations world-wide.¹³ The SF-36 has been updated to a second version (SF-36v₂) to increase range and precision for role-physical and role-emotional scales. This new version is less culturally biased and increases the ease of understanding for participants.¹⁴

There are 36 items in the SF-36v₂ and with the exception of one single item, health transition, (HT; which estimates the average change in health status in the year before administration), the remaining 35 items are grouped into the eight health domains: physical functioning (PF, covers limitations in daily life due to health problems), role-physical (RP, relates to physical health problems), bodily pain (BP, assesses pain frequency and pain interference with typical roles), general health (GH, measures individual perceptions of general health), vitality (VT, assesses energy levels and fatigue), social functioning (SF, measures the extent to which ill health interferes with social activities), role-emotional (RE, assesses role limitations due to emotional problems), and mental health (MH, measures psychological distress). There are also two aggregate (composite) scores (CS) calculated from the domains: mental wellness (MCS) and physical wellness (PCS).¹⁵ The domains specific to the MCS include the MH, RE, VT, and SF scales and the rest of domains are associated with the PCS (PF, RP, BP, and GH). The scores are calculated by summing responses across the questions (see Table 1 for number of questions in each domain) and then transforming the raw scores to a 0–100 scale. The CS scales were calculated by using the Ware's survey manual and higher scores indicate better physical and mental and physical health.¹⁵

Statistical Analysis

Descriptive statistics were used to present the data (means and standard deviations) and all data were screened for normal distribution and homogeneity of variance.¹⁶ A paired t-test was used to compare the pre-and post-test data from the SF-36v₂ and the level of significance was set at $p < 0.05$. A correlational analysis was performed to investigate the linear association between BMI and the health subscales of the SF-36v₂.

Results

Participants

Seventy-four students (65% F) signed up for the pre-test and 68 students (92%) completed the post-test SF-36v₂ (paper based) questionnaire and six students (2 engineering, 3 kinesiology, and 1 nursing) did not. Two students also did not complete the biometric measurements (n=72). The participants

had a mean (SD \pm): age 18.2 ± 1.1 yrs, weight 67.92 ± 15.0 kg, height 168.5 ± 11.6 cm, and waist circumferences 81.3 ± 9.8 cm at the start. The post-test weight changed but it was not statistically significant (weight 68.9 ± 15.7 kg, height 169.0 ± 9.5 and waist circumferences 82.4 ± 9.8 cm). Over half of the participants (57%) were registered in kinesiology (n=42).

Mental and Physical Wellness of Students

Significant decreases in four domains (VT, SF, RE, and MH) were observed between the pre-and post-test and no changes occurred in PF, RP, BP, and GH (see Table 1).

BMI and Physical Health

There was a statistically significant negative correlation between general health and BMI during the pre-test, $r = -0.343$, $p = 0.003$ and during the post-test, $r = -0.344$, $p = 0.005$. In addition, there was also a statistically significant correlation between physical functioning and BMI, $r = -0.350$, $p = 0.002$ but only during the pretest. No other statistically significant correlations were found between any of the remaining physical or mental wellness outcomes of the SF-36v₂.

Discussion

This study measured mental and physical wellness using the SF-36v₂ quality of life questionnaire in first year undergraduate students with a mean age of 18.2 ± 1.1 yrs. over a fall semester. Students' self-rated level of mental wellness (MCS) decreased significantly during their first semester; a result supported by previous literature in a population of medical students.^{17,18}

These decreases in self-rated wellbeing, which although may not be unexpected likely lead to academic performance consequences and may change the students' ability to enjoy their university experience. Previous research states that declining mental health has the potential to influence dropout rate and other health problems.¹⁹ As well, changes in mental health may affect the time and effort that students place on their academic pursuits and campus activities, decreasing their level of student engagement.²⁰ Further investigation into the academic consequences in a first-year undergraduate university population is

warranted as previously suggested by Hussain and colleagues, in 2013.²¹

The change in students' self-rated mental wellness (MSC) over the semester was statistically ($p < 0.001$) but not clinically significant as the MCS requires a difference of 27 points (range 1-100) to be equivalent to the impact of serious depressive symptoms.²² Student's domain scores (MH 76.3 ± 14.12 , RE 82.72 ± 20.63 , SF 88.79 ± 15.59 , VT 59.10 ± 15.25) at the semester start (pre-test) were higher than a similar university population (mean age 18.1 ± 1.41 ; MH 66.5 ± 17.56 , RE 56.96 ± 40.69 , SF 73.75 ± 21.78 , VT 55.96 ± 40.69).²³ However, all four domains within the MCS decreased significantly in our population over the semester (MH $p=0.019$, RE $p=0.014$, SF $p=0.004$, VT $p=0.003$). Vitality had the lowest and closest to the mid line score at the post-test (53.49 ± 19.80) and this decrease in VT is considered a common reaction of students when they are feeling overwhelmed by academic demands.²³ Poor VT can manifest itself in many ways but sleep quality is often identified and sleep plays a significant role in the cognitive processes related to mental health.²⁴ SF (88.79 ± 15.59) can also influence the ability to cope with emotions and this domain score was the highest in our population and it may have been influenced by the previous summer activities. It's possible that both domains (SF and VT) would further decrease over the second semester (winter) since stress has a known additive effect. These results suggest the need to offer programs on how to balance school and social commitments to cope with emotional distress so vitality is maintained early in the term of the first semester. Mental health promotion in first year should aim to enhance student's ability to achieve psychosocial well-being while learning to anticipate further adversity.

An interesting finding in our analysis was that PCS did not change ($p=0.242$). We could speculate that these students were protected in their first semester because of their high RE (82.72 ± 20.63) at the beginning of their first undergraduate year. However, as they move forward in their degree this may erode and the physical symptoms of stress may become noticeable. Clearly, having a longer study duration would be helpful in showing these mental health trends and or changes.

Table 1. Paired t-test and correlations of SF-36v₂ (possible range 0-100) pre-and post-test in first year university students (n=68)

	Pre-test	Post-Test			
Subscale, question number per domain ¹⁸	Mean, SD(±)		r	t	p
Mental Wellness (MCS)	76.22 ± 14.01	71.08 ± 17.69	.802	4.011	< 0.001
Mental Health (MH), 5	74.26 ± 14.12	71.32 ± 16.88	.803	2.405	0.019*
Role Emotion (RE), 3	82.72 ± 20.63	76.96 ± 25.52	.668	2.536	0.014*
Social Functioning (SF), 2	88.79 ± 15.59	82.54 ± 21.61	.621	3.019	0.004*
Vitality (VT), 4	59.10 ± 15.25	53.49 ± 19.80	.665	3.097	0.003*
Health Transition (HT)	60.29 ± 24.52	60.66 ± 24.17	.583	-0.136	0.829
Physical Wellness (PCS)	83.60 ± 11.17	82.28 ± 12.59	.709	1.181	0.242
Physical Functioning (PF), 10	90.07 ± 14.55	89.26 ± 16.05	.775	0.637	0.525
Role Physical (RP), 4	88.69 ± 14.34	87.59 ± 16.99	.464	0.555	0.580
Body Pain (BP), 2	81.43 ± 15.67	78.24 ± 18.23	.456	1.481	0.143
General Health (GH), 5	74.19 ± 14.37	74.04 ± 15.68	.707	0.105	0.917

Note: *df* 67; two tailed; *significant $p > 0.05$

The associated PCS domain scores were generally higher at the beginning of the semester (PF 90.07 ± 14.55 , RE 88.69 ± 14.34 , BP 81.43 ± 15.67 , and GH 74.19 ± 14.37) when compared to a similar university population (PF 90.01 ± 12.26 , RE 74.64 ± 32.53 , BP 74.74 ± 21.04 , and GH 62.28 ± 17.14).²³ This may be because over half of our sample was from kinesiology and these students prioritize their physical role and likely perceive themselves to be quite healthy versus a general studies sample of students.

Similarly, no correlation between BMI and mental wellness was found, and given the large amount of literature on the 'Freshman 15', a longer study duration would be important in identifying any trends related to this.²⁵ However, BMI decreases general health which reiterates the importance of continuing to encourage students to be active and adopt healthy habits.²³ This suggests the importance of more measures than just health promotion messaging alongside with coping strategies for maintaining mental wellness.

Academic success of students is enhanced by mental wellness^{2, 26, 27} and therefore there is value in investing in the mental health of students. In this study first year student's mental health decreased during the fall semester while their physical health remained the same. First line treatments usually include psychological therapies and medication, however psychological counselling spaces are limited and difficult to book. Postsecondary counseling services in Canadian Universities have identified wait-list issues and funding concerns, with 78% reporting they are unable to meet the growing demand for services.²⁸

Currently, a forward cultural shift seems to be occurring in mental health at universities in both Canada and the USA, with the implementation of a Mental Health Task Force.^{29,30} Part of this cultural shift is a focus on contributing factors to good mental health, e.g. time management, adequate sleep, regular meals, and physical activity that also includes recreation in the outdoors.^{31,32} While not always discussed and certainly not a replacement for medication or psychological health these changeable lifestyle factors do influence mental health and need to be encouraged and made accessible to those struggling. For example, the University of

Calgary (Alberta) has adopted the term 'UFlourish' based on Keyes' research (2011) that the absence of a mental illness is not the same as positive mental health.³³ UFlourish was designed with a series of activities aimed at building resiliency and positive mental health. Small meaningful changes can still be made even when there are time restrictions and financial limitations in a student's life. Similarly, the University of Pittsburgh School of Medicine, has adopted several strategies such as appointing faculty "wellness advisors," and sponsoring wellness initiatives to promote self-care. Their overarching goal is to provide schoolwide initiatives that help improve mental health and reduce stress among students.¹⁸

Promoting physical activity in universities may be another promising way to treat the growing number of depressed students in a cost-effective and efficient way. For example, in 2018 the University of Calgary (Alberta) Student Union Wellness Centre launched a peer support program combining social support and moderate intensity exercise. Students complete a one hour walk with a trained Peer Support volunteer while discussing concerns such as social isolation, academic stress and lifestyle changes. Many studies have shown physical activity has a positive way to decrease depression in an adult population²⁶ but few studies have been conducted in undergraduate student population. The current literature supports physical activity, as an approach to decrease the level of depression in a non-clinical sample of undergraduate students.^{26,34,35,36}

Limitations

Despite the relative strengths of a prospective study, there are also limitations to consider. This student sample lacked diversity (e.g. ethnicity, gender, geographical region, and sexual minority) and was underpowered and only reached 69% of sample size for the overall study (RECESS). Future studies should try to recruit larger samples of males and minority groups to increase diversity and examine critical differences in physical and mental wellness components as a function of academic institutions. In addition, this study focused on first year students at a single university in a western Canadian province that is home to three other universities. While these results must be taken with caution, given the limited sample, they are consistent

with a large amount of literature.^{17,18,19,23,29} The SF-36v₂ survey does not include “health distress, family functioning, sexual functioning, cognitive functioning and sleep disorders” (pp. 479).³⁷ These additional dimensions particularly sleep disorders would strengthen the survey, if they did not result in increasing participant burden. As stated previously, a longer study duration may help identify trends that highlight whether physical wellness changes along-side of mental wellness.

Conclusion

Several variables related to mental health declined in this population of undergraduate students in their first semester. It is well documented that student mental health is impacted by a variety of factors such as the transition to university from high school,³⁶ academic pressure, technology dependence, commuting issues and financial difficulties, it would seem that more still needs to be done to assist with maintaining and improving mental health on campuses, particularly in the first semester of the first year.³⁸ Unfortunately, a lack of resources, is often cited as a reason why universities are unable to effectively implement programs that help students learn to cope.¹⁸ Given these shortages in counselling resources, the demand for mental health treatment in the student population will only continue to increase. The recognition that vitality needs to be maintained or increased in this population underscores the importance of a mental health primary prevention focus³⁹ as early as possible in a student’s university career. This upstream approach of advocating for educating students about mental and physical wellness in their first year may also alleviate the demand for counselling and treatment in the following years of a university degree.

References

- Currie, C., Zanotti, C., Morgan, A., Currie, D., de Looze, M., Roberts, C., Samdal, O., Smith, O., & Barnekow, V. (2010). Social determinants of health and well-being among young people. Health behavior in school aged children (HSBC) study. *International Report from the 2009/2010 Survey*. Copenhagen: WHO Regional Office for Europe.
- Keyes, C.L.M., Eisenberg, D., Perry, G., Shanta, R., Dube, S.R., Kroenke, K., & Dhingra, S.S. (2012). The Relationship of Level of Positive Mental Health with Current Mental Disorders in Predicting Suicidal Behavior and Academic Impairment in College Students, *Journal of American College Health, 60*(2), 126-133, DOI: 10.1080/07448481.2011.608393
- Center for Collegiate Mental Health. (2018, January). *2017 Annual Report* (Publication No. STA 18-166).
- American College Health Association. (2014). *American College Health Association-National College Health Assessment II: Reference Group Executive Summary Spring 2014*. Hanover, MD.
- Kessler, R.C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustun, T.B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry, 20*(4), 359–364.
- Hysenbegasi, A., Hass, S. L., & Rowland, C. R. (2005). The impact of depression on the academic productivity of university students. *Journal of Mental Health Policy and Economics, 8*(3), 145.
- Eisenberg, D., Downs, M. F., Golberstein, E., & Zivin, K. (2009). Stigma and help seeking for mental health among college students. *Medical Care Research and Review, 66*(5), 522-541.
- Garlow, S.J., Rosenberg, J., Moore, J. D., Haas, A.P., Koestner, B., Hendin, H., & Nemeroff, C.B. (2008). Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depression and Anxiety, 25*(6), 482-488.
- Storrie, K., Ahern, K., & Tuckett, A. (2010). A systematic review: students with mental health problems—a growing problem. *International Journal of Nursing Practice, 16*(1), 1-6.
- European Commission. (2004). *Pre-conference: The mental health of children and adolescents*. Downloaded from https://ec.europa.eu/health/archive/ph_projects/2002/promotion/fp_promotion_2002_a01_16_en.pdf.
- Ware, J.E., & Gandek, B. (1994). The SF-36 Health Survey: development and use in mental health research and the IQOLA Project. *International Journal of Mental Health, 49*-73.

12. Zhang, Y., Qu, B., Lun, S. S., Guo, Y., & Liu, J. (2012). The 36-item short form health survey: reliability and validity in Chinese medical students. *International Journal of Medical Sciences, 9*(7), 521-6.
13. Corcoran, W.E, Durham, C.F. (2000). Quality of life as an outcome-based evaluation of coronary artery bypass graft critical paths using the sf-36. *Quality Management of Health Care, 8*:72-81.
14. Ware, J.E., Kosinski, M., Turner-Bowker, D.M., & Gandek, B. (2007). User's manual for the SF-12v2 Health Survey. *Lincoln, RI: Quality Metric Incorporated.*
15. Ware, J.E., Kosinski, M., Bayliss, M.S., McHorney, C.A., Rogers, W.H., & Raczek, A. (1995). Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the Medical Outcomes Study. *Medical Care, AS264-AS279.*
16. Julious, S.A., George, S., Campbell, M.J. (1995, Dec.). Sample sizes for studies using the short form 36 (SF-36). *Journal of Epidemiology and Community Health, 49*(6):642-644.
17. Abdulghani, H.M., AlKhanhal, A.A., Mahmoud, E.S., Ponnampuruma, G.G., & Alfaris, E.A. (2011). Stress and Its Effects on Medical Students: A Cross-sectional Study at a College of Medicine in Saudi Arabia. *Journal of Health, Population, and Nutrition, 29*(5), 516-522.
18. Karp, J.F., Levine, A.S. (2018, Oct 11). Mental Health Services for Medical Students — Time to Act. *N Engl J Med, 379*(13), 1196-1198. DOI: 10.1056/NEJMp1803970
19. Hjorth, C.F., Bilgrav, L., Frandsen, L.S., Overgaard, C., Torp-Pedersen, C., Nielsen, B., & Bøggild, H. (2016). Mental health and school dropout across educational levels and genders: a 4.8-year follow-up study. *BMC public health, 16*, 976. doi:10.1186/s12889-016-3622-8.
20. Kuh, G.D., Gonyea, R.M., & Palmer, M. (2001). The disengaged commuter student: Fact or fiction. *Commuter Perspectives, 27*(1), 2-5.
21. Hussain, R., Guppy, M., Robertson, S., & Temple, E., (2013). Physical and mental health perspectives of first year undergraduate rural university students. *BMC Public Health, 13*:848. <https://doi.org/10.1186/1471-2458-13-848>
22. McHorney, C.A., Ware, J.E., Jr., Raczek, A.E. (1993). The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care, 31*:247-263.
23. Chau, C.B., Saravia, J.C. (2016). Does stress and university adjustment relate to health in Peru? *Journal of Behavior, Health and Social Issues, 8*:1-7. DOI: 10.1016/j.jbhsi.2017.11.003
24. Ratcliff, R., Van Dongen, H.P. (2009). Sleep deprivation affects multiple distinct cognitive processes. *Psychon Bull Rev, 16*:742-751, 10.3758/PBR.16.4.742
25. Boyce, B.A., Kuijter R.G. (2015, Feb.). Perceived stress and freshman weight change: the moderating role of baseline body mass index. *Physiol Behav, 139*:491-6. doi: 10.1016/j.physbeh.2014.12.011. Epub 2014 Dec 4.
26. Adams, T.B., Moore, M.T., & Dye, J. (2007). The relationship between physical activity and mental health in a national sample of college females. *Women & Health, 45*(1), 69-85.
27. Fox, K.R. (1999). The influence of physical activity on mental well-being. *Public Health Nutrition, 2*(3a), 411-418.
28. Eisenberg, D., Hunt, J., & Speer, N. (2012). Help seeking for mental health on college campuses: Review of evidence and next steps for research and practice. *Harvard Review of Psychiatry, 20*(4), 222-232.
29. Crozier, S., Willihnganz, N. Docplayer. (2005). [2017-06-20]. Canadian counselling centre survey. <http://docplayer.net/3230999-Canadian-counselling-centre-survey.html> *webcite.*
30. Campus Mental Health Strategy. (2014). Creating a community of caring. University of Calgary, Alberta. Pp. 1-38. Downloaded from https://www.ucalgary.ca/provost/files/provost/15-unv-018mental_health_strategy_final.pdf

31. Hub Staff Report. (2018, Feb. 2). Report outlines recommendations to improve student mental health and well-being. *University New, Student Life*. John Hopkins University. Downloaded from <https://hub.jhu.edu/2018/02/22/final-report-mental-health-task-force/>
32. Fenton, F., White, C., Hamilton-Hinch, B., & Gilbert, R. (2018): The Impacts of Recreation Programs on the Mental Health of Postsecondary Students in North America: An Integrative Review, *Leisure Sciences*, pp. 1-25. DOI:10.1080/01490400.2018.1483851.
33. Keyes, C.L.M. (2007). Promoting and Protecting Mental Health as Flourishing: A Complementary Strategy for Improving National Mental Health. *American Psychologist*, 62, 95-108
34. Allgöwer, A., Wardle, J., & Steptoe, A. (2001). Depressive symptoms, social support, and personal health behaviors in young men and women. *Health Psychology*, 20(3), 223-227. <http://dx.doi.org/10.1037/0278-6133.20.3.223> DOI:10.1080/01490400.2018.1483851
35. Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. *Journal of American College Health*, 57 (5), 521-526.
36. Bray, S.R., & Born, H.A. (2004). Transition to university and vigorous physical activity: implications for health and psychological well-being. *Journal of American College Health*, 52(4), 181-188. DOI:10.3200/JACH.52.4.181-188
37. Ware, J.E., & Sherbourne, C.D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care*, 30(6), 473-483.
38. Flatt, A.K. (2013). A suffering generation: Six factors contributing to the mental health crisis in North American higher education. *College Quarterly*, 16(1).
39. Conley, C.S., Travers, L.V., & Bryant, F. B. (2013). Promoting psychosocial adjustment and stress management in first-year college students: The benefits of engagement in a psychosocial wellness seminar. *Journal of American College Health*, 61(2), 75-86.