PHYSICAL EXERCISE TO COMBAT ACADEMIC BURNOUT IN STUDENTS

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ABSTRACT

The purpose of this analytical study was to synthesize existing evidence relating to the association of exercise or physical activity with academic burnout in students. Relevant articles were systematically and rigorously searched using ten research databases. Following screening for relevancy, ten studies (eight cross-sectional, one cohort, and one interventional) were selected to include for final synthesis. All of the cross-sectional studies had good or satisfactory quality ratings, and the cohort and interventional studies included in this review had moderate to strong quality ratings. Six out of eight cross-sectional studies showed an inverse relationship of physical activity or exercise with academic burnout with the exception of two studies showed no significant associations. The cohort and interventional studies also demonstrated negative relationships of physical activity with academic burnout. The findings are likely to provide some evidence that physical activity may be capable to reduce academic burnout in students.

Keywords: *exercise, physical activity, burnout, students*

INTRODUCTION

Burnout, primarily, conceptualized as the three syndrome accompanied by psychological conditions including augmentation of emotional exhaustion, feelings of dis-attachment, and declination in outcome efficiency (Maslach & Jackson, 1981). Traditionally, irrespective of the nature of the job, the burnout has become important health concerns for all kind of occupations and it is believed to arise as an outcome of imbalance between existing cognitive resources of individuals and job-related demands. Similarly, students face consistent challenges against their cognitive resources because of academic demands. In this connection, researchers began to give attention on investigating the phenomenon of academic burnout among student populations. Given that the nature of the activities in which students engaged in and the tasks and assignments that the students require fulfilling to achieve their academic goals resembles in essence with other occupations with respect to placing demands on student's limited response resources. For

example, students have to face pressure in the form of engaging in examinations, attending classes, completing assignments and endeavoring for good grades during their student life. In the same lines, it is the possibility that similar to employees of other occupations students may experience emotional exhaustion due to excessive cognitive fatigue, detachment from the learning environment, and reduced academic outcomes.

Similar to professional burnout, academic burnout in students can be conceptualized as the psychological conditions characterized with onset of exhaustive feelings caused by excessive academic workload, the behavior of disengagement and withdrawal towards study related tasks, and attenuated academic efficiency (Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002). Evidence corroborates that burnt out students characterized with fatigue (Rella, Winwood, & Lushington, 2009) and exhaustive feelings (Law, 2007). Others found decreased interest in involving in study related activities, experienced lack of motivation towards learning (Cazan, 2015; Zhang, Gan, & Cham, 2007), as well as decreased perceptions concerning learning quality (Charkhabi, Azizi Abarghuei, & Hayati, 2013). Yang and Farn (2005) found that students with academic burnout yielded increased absenteeism from classes, feelings of usefulness and detachment with academic activities and reduced capacity to address study related affairs. These findings are likely to suggest that the psychological conditions related with academic burnout have many similarities to the symptoms of burnout in individuals of other occupations.

Academic pressures, irregular and insufficient sleep patterns, financial constraints, time constrains to complete academic tasks, staying in dormitories or away from the home, adjustment issues in new environment are very common among student populations that likely to make them more vulnerable for development of academic burnout. Evidence indicated that academic burnout is widely prevalent among various student populations. However, their prevalence rates significantly vary with respect to age, gender, study types, academic year, academic degree and majors, and institutional types (Aguayo, Cañadas, Assbaa-Kad-

douri, Ramírez-Baena, & Ortega-Campos, 2019). The rate of academic burnout was reported from 21% to 43% in students majoring medical education (Santen, Holt, Kemp, & Hemphill, 2010), 21% to 98% in occupational therapists (Sturgess & Poulsen, 1983), 31% in paramedic students (Stein & Sibanda, 2016), 43.3% in veterinary students (Ilić Živojinović et al., 2020), 35.79% to 87.72% in nursing students (da Silva et al., 2014), and approximately 17.4% to 73.5% in university students (Kristanto, Chen, & Thoo, 2016). Ladner, Mihailescu, Kern, Romo, and Tavolacci (2016) found that the prevalence of academic burnout is 7.7%, 19.1%, and 0.4% in university students majoring psychology, medical subjects, and law, respectively. These findings showed a very high rate of academic burnout among variety of student populations. The severity of the academic burnout among university students also lead to the idea of focusing on investigating efficient burnout preventive and management interventions among students.

In addition, it appeared that academic burnout is associated with variety of adverse academic, psychological and social outcomes. For example, Fiorilli, De Stasio, Di Chiacchio, Pepe, and Salmela-Aro (2017) found that student with symptoms of burnout exhibit depressive symptoms, poor academic performance, and in some cases dropout from the study program. Lyndon et al. (2017) yielded that high academic burnout is related with augmentation of test anxiety, reduced perceived quality of life, lower intrinsic motivation, decreased self-efficacy and reduced academic progress. Other studies reported a range of problems concerning sleep (Wolf & Rosenstock, 2017), self-control (Mazurkiewicz, Korenstein, Fallar, & Ripp, 2012), social support (Jacobs & Dodd, 2003) among burntout students. These findings suggest that prevalence of psychological and social problems is higher in students suffering from academic burnout. Thus, prevention strategies should specifically target reducing negative psychological conditions in students experiencing academic burnout. This also point out focusing on strategies that could exert mitigating effects on the correlated negative psychological conditions (i.e., anxiety, depression, self-control, self-efficacy, and sleep) in stud-

ents with burnout symptoms. Success and efficacy of burnout preventive strategies seem to be essentially related with improveing these negative psychological and social consequences of academic burnout.

Practicing exercise and sports are believed to exert positive effects on social, psychological, and academic life of student. Sports and exercise practices suggested being a major agent to reduce study related cognitive tiredness (de Vries, van Hooff, Geurts, & Kompier, 2016), decrease stress (Garber, 2017), improve cognitive functions (Li, O'Connor, O'Dwyer, & Orr, 2017), and improved social support, sleep (Wolf & Rosenstock, 2017), and self-efficacy (Caldwell, Harrison, Adams, & Triplett, 2009) among students. On the other end, reduced mental tiredness (de Vries et al., 2016), improved sleep (Wolf & Rosenstock, 2017), self-efficacy and social support (Jacobs & Dodd, 2003), and lower stress (Lindwall, Gerber, Jonsdottir, Börjesson, & Ahlborg Jr, 2014) related with reduced burnout. These findings suggest that exercise may play a buffering role to improve the social and psychological factors that are related with burnout in students. Thus, exercise may help to reduce burnout symptoms in students.

Moreover, Décamps, Boujut, and Brisset (2012) found that sports practices significantly related with decreased perceived academic stress, general stress, and improved emotional controls and self-efficacy among university students. Reduced perceived stress, depressive symptoms, anxiety, and improved sleep appeared to reduce mental fatigue in (exhaustion). In addition, it has been reported that burnout is strongly related with increased physical and psychological illness and practicing sports and exercise by youth related with decreased physical and psychological health. Moreover, exercise therapy has been widely used to treat various psychiatric diseases. During past few years, many researchers directed their attention to look into the relationship between exercise and academic burnout in the populations of students and found promising results. However, its efficacy to address academic burnout is yet to determine on critical and systematic grounds. In this regard, a significant gap exists that became

the cause of motivation for this analytical study. Burnout in students has unique and distinct characteristics due to academic workload and study related stressors (Reis, Xanthopoulou, & Tsaousis, 2015). Thus burnout interventions may interact differently because of distinct nature of this population and stressors faced by these people. It is also observed that practicing exercise and sports may not interact in the same way across the age, occupations, environment, type of cognitive load, and type of psychiatric conditions. Therefore, the purpose of this analytical approach is to present qualitative synthesis of the research evidence determining the associations of practicing sports and exercise with academic burnout along with aiming to point out major flaws and gaps in the past research.

METHODS

Eligibility for Studies

Following was the inclusion criteria for the studies: 1) studies examined the relationship of physical activity, sports, physical fitness, exercise, and inactivity / sedentary behavior / sedentary time, with burnout among students; 2) studies in English language; 3) published in any country and any year; 4) students having any subject, discipline, specialization, and major, and studying at any level in any type of education institution; 4) studies with any research design (i.e., interventional, cross-sectional, cohort, longitudinal); and 5) studies used any type or form of physical activity. We used following exclusion criteria: 1) studies addressing job related and occupation burnout rather than using students as a sample 2) studies used mix samples including students and person with any other occupations; 3) studies presented inadequate data regarding relationship of the variables of our interest in this analytical study; 4) and dissertations, letters, thesis, unpublished articles, conference papers, and books.

Literature Search

Relevant literature was systematically searched in 10 major research databases (Taylor & Francis, Cochrane Library, Science Direct, PubMed, JSTOR, SAGE Journals, Willey Online Library, ERIC, MEDLINE, Springer Link). The keywords of exercise, physical fitness, sports, inactivity,

sedentary behavior, and physical activity were combined with the keywords of academic burnout or student burnout by using the word AND to form search terms for this study.

Study Selection

Potentially relevant studies were searched, screened, assesses based on eligibility, and finally selected to include in this analytical study. To complete this whole procedure, two researchers independently followed these steps to finalize the studies for inclusion. Conflicts emerged between the both researchers were resolved through discussions on the status of the research article. No third reviewer was involved to address the controversies if emerged. Details regarding study selections is described and depicted in Figure 1 according to PRISMA (Moher, Liberati, Tetzlaff, Altman, & The, 2009).

Quality Appraisal of the Studies

We used two different study quality assessment tools to examine the methodological quality and risk of bias for the admissible studies. Quality of experimental and interventional studies was determined based on quality appraisal tool developed and used by Thomas, Ciliska, and Dobbins (2003). This tool suggested being reliable and valid to classify the studies with variety of research designs (cohort, longitudinal, randomized control trial, case studies, clinical controlled trials, and time series). For cross-sectional studies, "Newcastle-Ottawa Scale" was utilized to appraise the methodological quality of these studies and suggest its ranking based on scoring procedure prescribed by this tool (GA Wells et al., 2014). Quality appraisal was performed by two independent researchers. Differences of opinions concerning methodological quality of any study (if emerged) were addresses through discussions between the both reviewers. Studies with major flaws and classified in weak quality ratings were excluded from this analytical study. Studies with good and high level of methodological quality and having moderate or low risk of bias were considered to admissible in this analysis.

RESULTS

Study Selection

The scheme of study selection is presented in flow chart

depicted in Figure 1 based on PRISMA (Moher et al., 2009). A total of 3053 citations appeared based on search strategy. Of these, 847 abstracts were screened after separating repeated citations. Following removal of 741 ineligible abstracts, we found 106 full-texts of the publications that were further assessed for the potential of eligibility. Of these, 96 full-text articles found ineligible and were excluded. Thus, of these, 10 full-text published articles were eventually selected to include in this synthesis. These 10 studies had moderate to low risk of bias and therefore included in the synthesis.

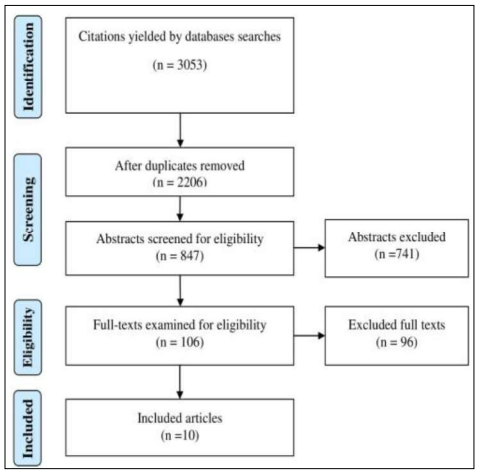

Figure 1. Search and selection procedure according to PRISMA guidlinmes (Moher, Liberati, Tetzlaff, Altman, & The, 2009).

Study characteristics

Evidence table was built based on the data extracted from 10 selected studies. The summary of characteristics of the incurporated studies is demonstrated in Table 1. Of the 10 selected studies, 8 studies were cross-sectional whereas among remaining two studies, one study was prospective cohort and one study was interventional that used randomized controlled trial research design. All of the 10 selected studies examined relationship of sports, exercise or/and physical activity with academic burnout in students. Assessment regarding relationship of physical fitness and sedentary behavior with academic burnout in students was absent. Students from diverse educational institutions attending various study programs in the USA (Dyrbye, Satele, & Shanafelt, 2017; Wolf & Rosenstock, 2017), Switzerland (Elliot et al., 2015; Gerber et al., 2015), Ireland (Macilwraith & Bennett, 2018), Hong Kong (Cheung & Li, 2019), Iran (Khosravi, Mirbahaadin, & Kasaeiyan, 2020), Saudi Arabia (Shadid et al., 2020), and in the Netherlands (de Vries et al., 2016). All of the eligible studies administered valid and reliable

exercise and physical activity measuring instruments with the exception of only one study that used single question with unknown validity and reliability to measure participation in sports and exercise (Shadid et al., 2020). Only one study used subjective measure of exercise (de Vries et al., 2016) whereas remaining 9 studies administered self-reported instruments. All of the studies administered self-reported valid and reliable academic burnout instruments.

With regard to study populations, among all of the selected ten studies, 6 six studies were performed in medical students. The remaining 4 studies involved students from vocational institutions (Elliot et al., 2015; Gerber et al., 2015), high school (Cheung & Li, 2019), and university students with various majors (de Vries et al., 2016). All of the studies were performed in normal healthy students.

Table-1:
The characteristics of the studies included in the synthesis.

Study Characteristics (cross-sectional)				
Author / Country	**Population and sample**	**PA Measure**	**Burnout measure**	**Results/ findings**
Cecil, J., et al (2014). UK	The sample was 356 medical students' ages ranged from 18 to 30 years.	IPAQ	MBI	PA significantly predicted symptoms of burnout.
Elliot, C., et al (2015) Switzerland	The sample involved 144 students having the mean age of 16.2 years studying in vocational institutions	IPAQ	SMBM , School Burnout Inventory	Vigorous PA was associated with decreased burnout among student adolescents.
Gerber, M., et al (2015). Switzerland	The sample was 56 students (age Mean = 18.1, SD = 1.2 years) from two vocational institutions in Switzerland.	IPAQ	SMBM	Burnout was significantly lower in participants met recommended level of MVPA.
Dyrbye, L. N., et al (2017). USA	Participate were 4,402 medical students selected from across the USA medical institutions.	Moderate intensity, vigorous intensity, strength training, and mix moderate and vigorous exercise was measured using four questions	MBI	Burnout rate was significantly lower in participates engaged more in aerobic and strength training exercises compared with their counterparts engaged less in these two types of exercises.
Macilwrait, P., et al (2018). Ireland	Sample was 383 medical students	IPAQ	MBI-SS	No relationship was observed between PA and burnout.
Cheung, P., & Li, C. (2019). Hong Kong	Sample was 1209 secondary school students (mean age =14.85, SD = 1.78) using convenience sampling	PAQ-C	MBI-SS	Non-burnout participants reported higher level of PA than their counterparts experiencing academic burnout.
Khosravi, M., et al (2020). Iran	Sample was 227 medical students selected through convenience sampling	"Baecke's physical activity questionnaire"	"Breso's academic burnout questionnaire"	Participants with higher level of PA exhibited significantly lower burnout scores compared with participants engaged in lower level of PA.
Shadid, A., et al (2020).Saudi Arabia	The sample was 356 medical students ages ranged from 18 to 24 years	Single item regarding participation in sports and physical exercise	MBI-SS	Exercise was not related with symptoms of burnout.
Longitudinal/ Cohort studies				
Wolf, M. R., et al (2017). USA	190 and 149 medical students were assessed at two time points at beginning and six months after first assessment respectively using prospective cohort design.	Godin Leisure-Time Exercise Questionnaire	MBI-GS	Reduced professional efficacy was significantly related with decreased exercise frequency in medical students.
Experimental/ Interventional studies				
de Vries, J. D., et al (2016). Netherlands	University students were randomly placed in to intervention (n=49) and waitlist control condition (n=48). Measurements were conducted at four time points at T0 (before intervention), T1 (after intervention), T2 (after four weeks), and T3 (after 12 weeks of termination of intervention) using RCT research design.	The intervention consisted of running with low intensity for three days a week during six weeks. Each session consisted of 60 minutes. Vo_2max was measured as an effect of exercise.	Dutch version of MBI was used to assess emotional exhaustion component of burnout	The symptom of burnout (emotional exhaustion) was significantly decreased from baseline to follow up periods in intervention group compared with control group.
***Abbreviations*:** IPAQ, "International Physical Activity Questionnaire"; MBI-SS, "Maslach Burnout Inventory-Student Survey"; PA, Physical Activity; VPA, "Vigorous Physical Activity"; PAQ-C, "Physical Activity Questionnaire for Older Children"; SMBM , "Shirom Melamed Burnout Measure";				

Methodological Quality

Among the eight cross-sectional studies, five studies had low risk of bias and those were rated in good category. However, the three studies had moderate risk of bias that was placed in satisfactory category. The remaining two studies (one cohort and one interventional), the interventional study had lower risk of bias and categorized as strong ratings (de Vries et al., 2016) and the one cohort study was placed in moderate rating due to having moderate risk of bias (Wolf & Rosenstock, 2017). Studies with higher risk of bias or having major methodological flaws were not considered to be included in this study.

Summary of Evidence

Of the ten eligible studies, eight studies found significantly inverse association of sports, exercise and physical activity with academic burnout in students with the exception of two studies (both cross-sectional) (Macilwraith & Bennett, 2018; Shadid et al., 2020) showing no associations. None of the selected studies demonstrated conflicting results in this regard.

DISCUSSIONS

The current analytical study is the first endeavor to determine relation of practicing exercise, sports, engaging in physical activity, and being sedentary/ inactive, and physical fitness with academic burnout in student populations studying various academic disciplines, and programs at variety of levels among the range of educational institutions across the globe. Filling this gap was critically essential to inform health related practitioners, educationists, and policy makers about the evidence based knowledge for decision making and implementing outcome based policies, interventions, and strategies to avoid development of academic burnout as well as treating these symptoms among learners. Following undergoing searching, screening, assessment of eligibility and methodological quality, ten studies were finally selected for the synthesis. All of these studies had moderate to low risk of bias. Among these, eight studies were cross-sectional, one cohort, and one was interventional/ experimental study with randomized controlled trial (RCT) design. Six out of eight cross-sectional studies demons-

trated negative association of training of exercise, sports, and physical activity with academic burnout in students whereas two cross-sectional studies reported no associations. However, no study reported positive associations. On the other hand, both cohort and interventional studies also found inverse association of exercise and academic burnout in this population. Thus, except two studies showing no associations, findings of the eight out of ten studies are in the same line suggesting positive effect of exercise and physical activity on academic burnout.

Among these, two studies yielding usefulness of aerobic exercise for reducing academic burnout in student (de Vries et al., 2016; Dyrbye et al., 2017). One study found positive effect of leisure time exercise on burnout (Wolf & Rosenstock, 2017). Remaining fives studies demonstrated efficaciousness of physical activity for reduction of burnout symptoms in students. These studies demonstrated negative association of moderate to vigorous physical activity (Gerber et al., 2015), vigorous physical activity (Elliot et al., 2015) and exercise frequency (Wolf & Rosenstock, 2017) with academic burnout. The remaining three studies found these associations regardless of the intensity of the activity (Cecil, McHale, Hart, & Laidlaw, 2014; Cheung & Li, 2019; Khosravi et al., 2020). No study demonstrated associations of inactivity, sedentary behavior, sittings time, or physical fitness with academic burnout. In general, these findings provide some evidence with some limitations for the efficacy of exercise training and practicing physical activity to mitigate academic burnout symptoms in students. However, interpretations of these findings should be made with caution. Because, six out of the eight studies suggesting these findings were cross-sectional and cause and effect links cannot be suggested based on the studies used cross-sectional research designs. Only one prospective cohort and one randomized control trial study presented evidence in the favor of effectiveness of exercise and physical activity to reduce academic burnout among students. For the strong and sufficient evidence, more studies with randomized control trials, longitudinal observations, and clinical control trials are essential. Findings on

the association of inactivity / sedentariness and physical fitness with academic burnout may add more insight on the evidence based suggestions in this regard. It is evident that a higher level of physical fitness is indicator of increased participation in exercise or more engagement in physically activity. On the other side, decreased physical activity, inactivity, increased sitting time are believed to exert negative influence on physical fitness leading to poor physical fitness. Determining the association among physical fitness and inactivity with academic burnout may add more understanding on the evidence regarding efficacy of exercise training to combat burnout in students.

To this end, the findings emerged from this synthesis for the negative relationship of physical activity and exercise with academic burnout was coinciding with our expectations. Past research has demonstrated that physical activity and exercise involvement exerts positive influence on burnout symptoms in variety of other populations including healthcare workers (Lindwall et al., 2014), teachers (Carson, Baumgartner, Matthews, & Tsouloupas, 2010), university faculty (Ali, Ranjha, & Bukhari, 2020), physicians (Olson, Odo, Duran, Pereira, & Mandel, 2014), and in employees with various occupations (Hu, Chen, & Cheng, 2016). Potential mechanisms that underlie the effectiveness of physical activity for academic burnout are explicitly unknown yet. However, it is likely that exercise may increase cognitive efficiency (Li et al., 2017), reduced cognitive tiredness and mental fatigue (de Vries et al., 2016), and reduce stress (Shadid et al., 2020), that may further lead to reduce burnout in student.

Limitations, Gaps and Future Research

Most of the previous research focused on presenting findings on this topic in medical students. Generalization of these findings requires more studies in wide range of student populations. Studies on school students with varied level are scars. For example, in previous research, only one study afforded evidence from secondary school students. No study was done among students of primary school, middle school and college level. Student life in these stages undergoes

wider range of stressors and significant level of cognitive load that may cause development of burnout symptoms. In addition, only one study involved participates from university students that are also insufficient to confirm the evidence. More studies are needed among university students to strengthen the evidence on the relationship among these variables.

With regard to study majors and educational disciplines, previous research mainly focused on investigations among medical student. Findings from the students with other majors including engineering, pure science, biological sciences, veterinary education, pharmaceutical education, agricultural studies, social sciences are almost absent. It is likely that students with different majors and subjects may have different level of risk of academic burnout and different level of physical activity that may interact differently. Future research should explore the findings missing from previous research in these populations of students. Moreover, it is also still unknown that what relation exists between physical activity and academic burnout among students at varied study level such as undergraduate, graduate and post-graduate study levels.

With regard to study designs, one study used RCT design and one study used cohort design. These numbers of studies in these designs are insufficient. More studies with RCT cohort, longitudinal research designs are needed. In addition, only one study used objective measure of exercise whereas all of the other studies administered self-reported physical activity measuring tools. It is suggested that in interventional studies objective measures of exercise should be administered to increase the quality of the evidence in this area. Much of the research on this topic was performed without considering the specified effects of physical activity or exercise with various intensities (i.e., low, moderate and vigorous), frequencies and durations on academic burnout. These issues in this area of research may also be considered in the future. In addition, potential mechanisms contributing reduced academic burnout need to be explored in future research.

CONCLUSION

Lastly, despite some limitations and gaps in the empirical evidences, there is some possibility to recommend practicing exercise and physical activity for prevention and treatment of academic burnout among students. Academic burnout prevention strategies should focus on encouraging students to practice sports, exercise activities and adapting active life style to avoid burnout during their student life. Sports and exercise activities should be incorporated while addressing mental health related issues in students. The identified gaps in this analytical study needed to be addressed in future studies in this area. Psychiatric health practitioners, educationists, and policy makers can benefit while planing and implementing mental health practices from the findings emerged from this qualitative synthesis.

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