NECESSITY OF PHYSICAL ACTIVITY TO REDUCE HOPELESSNESS: AN ANALYTICAL APPROACH

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Abstract:

This analytical study sought to present a summary of existing evidence regarding the association between hopelessness and physical activity (PA) identifying major gaps in previous research. For this purpose, a systematic search was performed in 14 major databases. Following screening process and undergoing rigorous quality appraisal, a total of 19 studies were eventually selected for inclusion in this review study. Among those, 13 were cross-sectional, 5 interventional and one was a cohort study. Regardless of the study designs, the results of all the studies consistently found a significant inverse relationship between physical activity and hopelessness except for one cross-sectional study showing no associations between the two variables. These findings advance considerable support for the utilization of physical activity as an interventional approach to reduce and treat hopelessness. In this regard, major gaps are identified and discussed to guide future inquiries addressing this issue.

***Keywords**: psychiatric disorders, hopelessness, physical activity, intervention.*

Introduction:

In psychiatric and health care situations, hopelessness is a phenomenon that is increasing overwhelmingly among individuals. Hopelessness / powerlessness can be conceptualized as "the expectancy or probability held by the individual that his own behavior cannot determine the outcomes or reinforcements he seeks. A perception of powerlessness occurs after repeated events when the person is separated from the results of his actions, although the outcomes may be the desired ones" (Schneider, 1980, p.13). Feelings of hopelessness have become widely prevalent in recent decades. Studies reported certain level of feelings of hopelessness in general healthy people (Kocalevent et al., 2017). However, the rates of this phenomenon found to be differed among wide range of populations e.g., 54.4 % in medical students (Coskun, Ocalan, Ocbe, Semiz, & Budakoglu, 2019), 30.9% among adults (Hamzaoglu, Ozkan, Ulusoy, & Gokdogan, 2010), and 50% among abu-

sed women (Kısa, Zeyneloğlu, & Verim, 2019) in Turkey. In addition, this phenomenon existed 10.8% in older US people (Anda et al., 1993), 13.9% in Spanish university healthy students (Viñas Poch et al., 2004), and 28% in Iranian patients with congenital heart disease (Eslami, Kovacs, Moons, Abbasi, & Jackson, 2017). The above-mentioned statistics likely to suggest that the degree of feelings of hopelessness may vary regarding psychological disorders, physical illness, profession, age, and gender of the individuals.

Increased feelings of hopelessness beyond the certain level in individuals may result in adverse outcomes for psychiatric and physical health. For example, studies showed increased risks of suicidality and self-injury (Lew et al., 2019; Viñas Poch et al., 2004), cardiovascular diseases and metabolic syndrome (Valtonen et al., 2008), ischemic heart disease in older people (Anda et al., 1993). Further, the increased rate of mortality, injury, violence, cancer, and myocardial infarction (Everson et al., 1996). Furthermore, hopelessness may interrupt academic performance among students (Viñas Poch et al., 2004) and cause declination in cognitive ability (Kashani, Soltys, Dandoy, Vaidya, & Reid, 1991). The findings of those studies suggest that higher level of hopelessness has poisonous effects on individuals' health. Therefore, it has become the priority of health professionals to investigate interventions, treatment options, and strategies that can be effective for prevention/treatment of hopelessness among clinical as well as non-clinical individuals.

In addition, hopelessness correlates with several psychological variables such as loneliness (Joiner Jr. & Rudd, 1996), lower self-esteem, higher anxiety and increased psychopathology (Kashani et al., 1991), depression (Umlauf, Bolland, Bolland, Tomek, & Bolland, 2015), and sleep problems (Umlauf et al., 2015). On the other hand, exercise and physical activity have gained popularity as a therapeutic option for the prevention and treatment of various psychiatric disorders in health care setting. For example, physical exercise can be an effective medicine for self-injurious behavior (Ali, Azam, & Mattiullah, 2020). Also, exercise has

been found to be helpful in improving anxiety disorder (Gordon, McDowell, Lyons, & Herring, 2020), depressive disorder (Gökçe, Güneş, & Nalçaci, 2019), loneliness (Pels & Kleinert, 2016), sleep (Wang & Boros, 2019), and self-esteem (Dale, Vanderloo, Moore, & Faulkner, 2019). It seems that the psychological issues which correlate with feelings of hopelessness can be improved by increasing physical activity or using exercise as an intervention. This point to the view that physical exercise might somehow play role in mitigating negative influence of psychological conditions those are suggested to be correlated with hopelessness. Thus, physical activity or exercise can be effective to revert feelings of hopelessness. Specifically, evidence has indicated that the level of optimism can be increased through increased regular involvement in physical activity or exercise programs (Progovac et al., 2017) and increased optimism possibly contribute to mitigate the feelings of hopelessness that may lead to prevent or treat the related psychiatric conditions (Bryan, Ray-Sannerud, Morrow, & Etienne, 2013). These findings support the therapeutic use of physical activity for prevention and treatment of hopelessness.

The terms sport, exercise and physical activity generally used synonymously, however, there is some difference among these concepts. The concept of physical activity is concerned with doing any kind of activity characterized by voluntary movements that require certain level of physical exertion and burning of calories such as doing household work, walking to go to school, or job-related work etc. (Zourikian, Jarock, & Mulder, 2012). While, exercise is considered as a type of physical activity that involves voluntary movements, burning of energy, and physical exertion characterized by planned, organized, and repetitive actions without the sense of winning or losing competitions e.g., walking, jogging, running, or recreational swimming (Zourikian et al., 2012). However, the term sport is conceptualized as the form of exercise and physical activity that involves competitions and skills in the framework of certain goals and rules such as playing soccer, golf, hockey, tennis etc. (Zourikian et al., 2012). Since physical exertion, voluntary movement,

and energy expenditure are common components among the three concepts, therefore, the term physical activity from those terms will be used in this article.

Though, physical activity may have the potential to serve as a therapeutic means to deal with the psychological and health-related issue of hopelessness, however, no systematic and critical study has been furnished to date determining its efficacy for the subject purpose. It is, therefore, needful to find potential gaps in the previous research literature on this topic of great importance and to critically evaluate the quality and strength of existing research studies examining associations of exercise and physical activity with the phenomena of hopelessness regarding general health and psychological health of clinical and non-clinical populations. Findings emerged from this work may be beneficial for professionals and policy makers dealings with psychiatric health issues in patents and healthy persons for its efficacy, outcome-based treatment, and preventive interventions, policies, and strategies in health care setting. Thus, the primary objective of this analytical work is qualitatively synthesizing the previous research intends to determine links of exercise and physical activity with the feelings of hopelessness. Another goal of this work is to identify gaps in previous research and to present directions for further investigations.

Methods:

Criteria to include or exclude the articles

Following criteria were adopted to decide admission or exclusion of the studies.

Criteria for inclusion were 1) articles demonstrated sufficient data regarding relationship of involvement in sports, exercise, sedentary behavior, physical activity, and physical fitness with hopelessness, 2) articles involved clinical and non-clinical persons, healthy and patient people having any gender, age, profession or setting, 3) studies performed in any country and geographical region. 4) Investigations used any research design, 5) articles used primary and secondary data, 6) articles published in English until April 2020.

Exclusion criteria were 1) articles published in the language

other than English, 2) dissertations, theses, proceedings of conferences, chapters of the books.

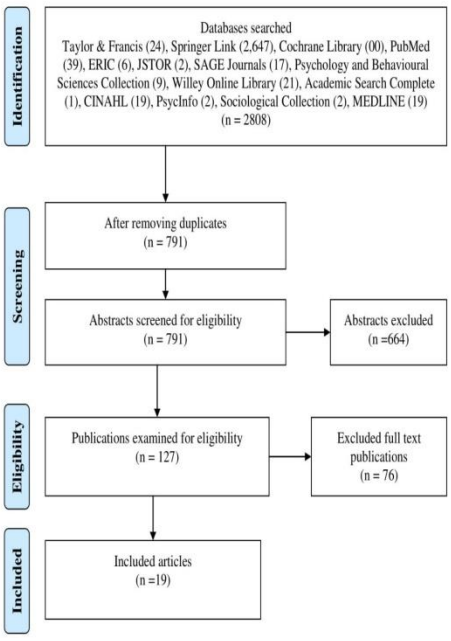
Articles Search scheme

14 important research databases (Taylor & Francis, Springer Link, Cochrane Library, PubMed, ERIC, JSTOR, SAGE Journals, Psychology and Behavioral Sciences Collection, Willey Online Library, Academic Search Complete, CINAHL, PsycInfo, Sociological Collection, MEDLINE) were systematically searched in March and April 2020. Additional search was conducted in Google scholar to locate the articles that were not appeared in the research databases mentioned above. Further, relevant articles were identified by screening of the reference lists of the relevant studies. Physical activity related terms (sports, exercise, sedentary behavior, physical activity, and physical fitness) were combined with the keyword of hopelessness by using the word AND between them to produce search terms for databases.

Articles selection

Figure-1 demonstrated the scheme of articles selection that was followed in this review based on PRISMA guidelines (Moher, Liberati, Tetzlaff, Altman, & The, 2009). Screening was conducted to identify potentially related titles and abstracts by the first two expert researchers (AA & MA). Subsequently, full-text articles were also obtained and rigorously reviewed for relevancy keeping in view the inclusion and exclusion criteria by both researchers. In case of arising any disagreement regarding study selection, agreement was reached through discussions.

Figure 1.
Studies selection scheme based on PRISMA (Moher, Liberati, Tetzlaff, Altman, & The, 2009)



Data extraction

Table-1 depicts the summary of the data extracted from admissible articles. The selected studies were critically reviewed and comprehensively screened to extract the relevant data. Data were extracted from admissible articles concerning authors of the article, country where the study was conducted, population, sample size, participant's ages, profession, clinical conditions (if any), participants health status, gender, measuring tools used to assess variables of the interest, analysis, and findings.

Study Quality Appraisal:

The Two expert researchers were involved in assessing critically the methodological quality of the admissible studies. For this purpose, two valid and reliable study quality appraisal instruments were used to assess the methodological quality of the selected articles. Quality appraisal of cross-sectional investigations was performed by using "The Newcastle-Ottawa Scale" that is considered specifically suitable and designed for quality appraisal the studies used cross-sectional research designs (Herzog et al., 2013; Wells et al., 2015). Quality appraisal of studies used randomized clinical trials, cohort, control clinical trials, and longitudinal research designs was conducted the instrument used by Thomas (2003). The scoring and rating procedure was used as prescribed by Picot et al. (2012) for this tool. This quality appraisal instrument is considered suitable for the studies used variety of research designs (i.e., used randomized clinical trials, cohort, control clinical trials, and longitudinal).

Results

Study selection

The performance of rigorous and systematic search in 14 research databases resulted in yielding 2808 citations in total (Figure 1). 791 abstracts were chosen following removal of duplicates. Of these, 664 abstracts were excluded due to not meeting eligibility criteria. Subsequently, full text of 127 research publications were attained and critically assessed against the eligibility criteria determined for this review. Following critical screening of 127 full-text articles, a total of 19 research publications were eventually chosen to admissible in this qualitative synthesis.

Study characteristics

Among all admissible investigations, 13 studies used cross-sectional research design and one study was prospective cohort study. The remaining 5 studies were recognized as interventional / experimental studies. Among these, 2 experimental studies involved longitudinal assessments, 1 study used cohort analytical design, and remaining two experimental studies involved randomized control trial (RCT) and randomized cross-over research designs, respectively.

Among cross-sectional investigations, 8 were conducted in USA (Baumert Jr, Henderson, & Thompson, 1998; Brosnahan, Steffen, Lytle, Patterson, & Boostrom, 2004; Harding, 2012; Plow, Allen, & Resnik, 2011; Sibold, Edwards, Murray-Close, & Hudziak, 2015; Taliaferro, Rienzo, Miller, Pigg, & Dodd, 2010; Taliaferro, Rienzo, Miller, Pigg Jr, & Dodd, 2008; Taliaferro, Rienzo, Pigg, Miller, & Dodd, 2009), one in Australia (Cashin, Potter, & Butler, 2008), one in Finland (Valtonen et al., 2008), one in Taiwan (Page, Lee, Miao, Dearden, & Carolan, 2003), one in Norway (Chioqueta & Stiles, 2007), and one was performed in Turkey (Gümüş, Öz, & Kırımoğlu, 2011). Of the 6 studies (one cohort and 5 experimental), 2 studies were conducted in USA (Dunn et al., 2017; Dunn, Stommel, Corser, & Holmes-Rovner, 2009), one in Turkey (Tekin, et al., 2010), and remaining one was performed in Finland (Valtonen et al., 2009).

Among the 13 cross-sectional studies, only one study administered the valid and reliable assessment instrument of physical activity (Valtonen et al., 2008). Other studies used single, two and three items chosen from valid physical activity measures or the measures with unknown validity and reliability. In other studies (Cohort and experimental), 2 studies used valid and reliable physical activity measures. Thus, among all selected studies, only three studies used valid physical activity measure. This suggests that studies with valid and reliable physical activity measure are extremely lacking. Future research should consider this major gap regarding use of valid measure in hopelessness research. Regarding use of objective measures of physical activity, only two studies use objective measures such as

Valtonen et al. (2008) used VO2 Max, and Valtonen et al. (2010) used cardiovascular fitness test of Maximal oxygen on ergometer. All the other studies used self-reported measures of sport and physical activity. This also identifies that use of objective measures are extremely lacking in this area of research.

In connection with measures of hopelessness, 10 studies used valid and reliable assessing tools of hopelessness including 5 in cross-sectional (Cashin et al., 2008; Chioqueta & Stiles, 2007; Gümüş et al., 2011; Page, 1991; Taliaferro et al., 2010) and 5 in interventional / experimental studies (Dunn et al., 2017; Dunn et al., 2009; Sturm et al., 2012; Tekin, et al., 2010; Yìğìter, 2014). Other 9 studied used selected items from valid hopelessness measures or measures with unknown validity. This demonstrates that approximately half of the included studies did not use gold standard valid measures of hopelessness.

Table-1
Characteristics of the Studies Assessing Relationship of Physical Activity with Hopelessness

Cross-sectional Studies							
Author/ Country	**Population, Sample, Participants ages**	**Male %**	**Resp. Rate (%)**	**PA Measure**	**Hopelessness Measure**	**Analysis**	**Results/Findings**
Baumert, et al., (1998) USA	Sample was 7179 high school students. Survey study design.		86	Single question asking participation in organized sport during last year with determined validity	Single item hopelessness measure with unknown validity.	Chi-square analysis and multiple linear regression	Frequency of feelings of hopelessness was lower in athletes than those of non-athlete counterparts.
Page, et al., (2003) Taiwan	Sample was 2665 student adolescents (ages from 15 to 21 years) came from 21 high schools through random sampling.	58.68	94.50	Three item frequency of VPA, muscle toning exercises, and sports participation with unknown validity	BHS	ANOVA	Both male and female students involved in Insufficient physical activity demonstrated significantly higher level of hopelessness compared with their counterparts involved in sufficient physical activity.
Brosnahan , et al., (2004) USA	Sample was 1870 high school student (ages, 14-18years). Random selection of schools but convenience sampling was used to select classes and students.	53	93.50	Frequency of moderate and vigorous PAs, strength and toning, participation in PE, and participation on sports teams	Single item related to feelings of hopelessness	Logistic regression Used primary data for analysis	There was negative relation between attending physical education classes and sadness.
Chioquet, & Stiles, (2007) Norway	84 university students (19 to 54 years)	NR	NR	Three items sports engagement, sport type and frequency of participation with unknown validity	BHS	multiple regression primary data	University involved in active sport more frequent reported less frequency of hopelessness.
Cashin, Potter, & Butler, (2008) Australia	914 prisoners, random sample Primary focus	81.72	NR	Frequency and duration of exercise per week with unknown validity	BHS	Linear Regression Pearson Correlation Primary data	Exercise duration and hopelessness were inversely related with one another.
Taliaferro, et al., (2008) USA	13,857 (ages 12 to 18 years) school students' sample of both genders.	48.1	NR	Frequency of MVPA through single item during last week Single item of Participation in team sports. Validity was unknown	Single item of hopelessness with unknown validity	Descriptive statistics Logistic regression analyses secondary data	1-More frequent vigorous physical activity related with decreased hopelessness in male adolescents. 2-Sports reduced the risk of hopelessness in both boys and girls.
Valtonen, et al., (2008) Finland	2428 men their ages ranged from 42 – 60 years	100 % men	91.27	LTPA Questionnaire that is valid and reliable measure VO2max using ergometer. Valid objective measure of cardiovascular fitness.	2 items related to hopelessness selected from valid measure	one-way ANOVA, chi-squared test logistic regression used primary data	Inverse relationship appeared of hopelessness with cardiovascular fitness and MVLTPA in middle aged men.

Taliaferro, et al., (2009) USA	Sample was 43,499 college students (ages ranged from 18 to 25)	64.5	NR	One item concerning vigorous exercise and one item related to tonic activity with unknown validity	Single item asking about hopelessness feeling with unknown validity	descriptive statistics logistic regression used primary data	Haplessness was significantly lower in physically active, particularly who engaged in aerobic exercise in college students than inactive students.
Taliaferro, et al., (2010) USA	450 undergrad university students (aged, 18 to 24 years) participated in the survey using convenience sampling in one university	26	86.20	Two items of sports participation. MVPA by two items from previous survey questionnaires with unknown validity	BHS	Descriptive statistics, independent samples t tests, simple correlations, regression analyses used primary data	Sports participation was significantly negatively correlated with hopelessness.
Plow, et al., (2011) USA	490 community dwelling older people (ages 65 and above) participated in the study using random sample.	20.4	33.7	Single question regarding frequency of MPA per week from a valid and reliable measure of GLTEQ	Single item from a valid haplessness measure of BHS	Chi-Square Ordinal regression, Used primary data	Increased hopelessness tends to decrease PA in low-income older persons.
Gümüş, Öz, & Kırımoğlu , (2011) Turkey	90 adolescents, convenience sampling	NR	100	Single item sports involvement with unknown validity	BHS Valid measure	independent t-test primary data	No relation was found between PA and hopelessness.
Harding, (2012) USA	Participants were 1784 cancer patients with ages ranged from 18-40 years	63	100	Two items concerning moderate and vigorous PA from valid PA measure	Single item about hopelessness feelings with unknown validity	Chi-square tests, univariate analyses. Secondary data	Physically more active patients demonstrated lower hopelessness.
Sibold, et al., (2015) USA	Sample included 13,583 student adolescents through random sampling	NR	99	Single item frequency of physical activity during past week	Single item hopelessness with unknown validity	logistic regression Secondary data	Higher frequency of physical activity related with reduced level of hopelessness in both bullied and non-bullied adolescents.
Prospective cohort/longitudinal studies							
Valtonen, et al., (2010) Finland	2682 men were followed up remaining 630 men at the 4-year follow-up and 509 men at the 11-year follow-up	100	80.79	LTPA with described validity Cardiovascular fitness using ergometer Maximal oxygen uptake	Two questions related to hopelessness with unknown validity	Student's t-test Logistic regression Chi square test Primary data	LTPA and haplessness were negatively related with one another. No relationship was significant for cardiovascular fitness and hopelessness.
Interventional/experimental studies							
Dunn, et al (2009) USA	Sample was 207 heart patients having ages ranged from 32-86 years	66.18	60.57	Hospital based exercise program for rehabilitation of heart patients	BHS	Logistic regression, Primary data	Patients experienced more hopelessness reported less engagement in exercise.
Dunn, et al., (2017) USA	324 heart patients (31-91 years) followed up at three time point (3, 8, 2 months). 166 participants completed the study	67.3	48.77	Exercise programs at home and hospital. CREPT Valid and reliable measure exercise	STHS Valid measure	Generalized linear mixed models	Home based exercise programs tend to decrease hopelessness in heart patients.

Tekin, et al., (2010) Turkey	56 older people Mean age: TTC group: males, 71.2 and females, 75.6 years Control group: males, 71.8 and females, 76.5	50	NR	Intervention was Tai Chi Chuan (TCC) exercise program (10 min warm up 40 min TCC exercise, 10 min cool down) for six months	BHS	Mann Whitney U test, Wilcoxon test	TTC has positive effect on hopelessness in both males and female older people.
Sturm, et al., (2012) Austria	20 hopelessness patients randomly placed into intervention group and control group	30	5	Hiking program consisting of 2-3 hrs. with the intensity of 65–75% for 3 days per week for 9 weeks during intervention period	BHS	t-test, Fishers exact test, Pearsons product-moment correlations,	Haplessness level was decreased in result of mountain hiking in clinically diagnosed patients with hopelessness.
Yiğiter, (2014) Turkey	80 female university students (intervention group n=40, mean age, 21.52) and control group (n=40, mean age, 22.15)		NR	intervention group followed exercise program of moderate intensity including 60 min/day, 3days/week for 12 weeks in gymnasium	BHS	Two-way repeated measures analysis of variance (ANOVA)	Hopelessness level was reduced in intervention group comparing with control group.

Abbreviations: "NR: not reported, PA: Physical activity, IPAQ: International Physical Activity Questionnaire, BHS: Beck Hopelessness Scale, STHS: State-Trait Hopelessness Scale, MVLTPA: Moderate to Vigorous Leisure-Time Physical Activity, STHS: State-Trait Hopelessness Scale, CREPT: Cardiac Rehabilitation Exercise Participation Tool, MPA: Moderate Physical Activity, GLTEQ: Godin Leisure-Time Exercise Questionnaire"

Summary of evidence:

Regarding effectiveness of physical activity for hopelessness, all of the studies (cross-sectional, cohort, and experimental) exhibited usefulness of physical activity to improve hopelessness, except one cross-sectional study that found no association of physical activity with hopelessness (Gümüş et al., 2011). Regarding age of the participant, 4 studies (cross-sectional) showed effectiveness of physical activity for improvement in haplessness in school-going adolescents, 3 studies (2 cross-sectional studies and one experimental study) for early adults including college or university students, 5 for adults, 2 in older people. Other studies used participants with varied ages ranged from 18-91 years. No study was conducted in children. Regarding physical and psychiatric diseases, 3 studies yielded beneficial effects of physical activity for patients populations including heart patients (Dunn et

al., 2017; Dunn et al., 2009), and hopelessness patients (Sturm et al., 2012). Notably, studies conducted in psychiatric patients and individuals with severe psychological disorders are scarce.

Quality of the studies:

Cross-sectional studies: The quality appraisal tool used for cross-sectional studies rated these studies in to four categories including very good, good, satisfactory, and unsatisfactory, respectively. Among the 13 cross-sectional publications, only one study had low risk of bias that was placed in very good category. However, 5 and 7 studies were placed in good and satisfactory ratings, respectively. This data demonstrated that studies with very high methodological quality are still scars.

Cohort and experimental / interventional studies: According to the quality appraisal tool used for these studies, these studies were rated in three categories including weak, moderate, and strong, respectively. Among the 6 studies with these research designs, only one study was rated as strong category. Among the remaining five studies, 2 and 3 were classified as moderate and weak studies, respectively. This indicates that studies with longitudinal, cohort, RCT, CCT research design with moderate and strong methodological quality are insufficient on this topic.

Discussion:

We sought to present qualitative synthesis of the publications presented data on the link between physical activity and hopelessness along with identifying significant gap in the current research. Presenting critical analysis of the existing findings was extremely essential to determine therapeutic value of physical activity for the patients and healthy population experiencing feelings of hopelessness. Indeed, evidence -based practices can produce effective outcomes and long-term benefits in connection with dealing the phenomenon of hopelessness in recent times. This work, to date, as per our knowledge, is the first endeavor to present findings regarding qualitative synthesis of the current literature on this topic of great interest. For this purpose, nineteen studies were included that met eligibility criteria of this review.

The main findings emerged from this qualitative synthesis explored that of the 19 studies, 18 studies demonstrated inverse associations between level of hopelessness and physical activity, apart from one study showing no relationship between these two variables. This suggests that hopelessness can be reduced through increasing level of physical activity among the individuals experiencing symptoms of hopelessness. However, this finding needs to be interpreted with caution because 13 out 19 studies (68.42) were cross-sectional in nature. Findings based on cross-sectional studies have believed to have insufficient strength due to potential of increased risk of biases in these designs. In addition, only 6 (31.57%) studies reported effectiveness of physical activity to reduce level of hopelessness. These studies used strong research designs including longitudinal, cohort and randomized control trials. Notably, among these studies only three studies had sufficient level of methodological quality. The remaining three studies had low methodological quality suggesting higher risk of bias in these studies. There is no inconsistency among the findings of all studies as the results of all studies on the relationship between these variables are in the same line. No study reported conflicting findings in this regard. This tends to add up the strength of the evidence on this topic. Another strength of this findings is the support came from the three studies that used strong research designs of longitudinal prospective cohort (Valtonen et al., 2010), randomized crossover trial (Sturm et al., 2012), and randomized control trial (Yiğìter, 2014). Among these Valtonen et al. (2010) used objective measure of cardiovascular fitness, whereas, Sturm et al. (2012) and Yiğìter (2014) used exercise as intervention along with administering a gold standard valid and reliable hopelessness measure. These studies have low or moderate risk of bias that made significant contributions in determining associations between hopelessness and physical activity.

In general, despite some limitations and paucity of strong evidence, the findings emerged from this critical analysis lend some support for the efficacy of physical activity-based therapeutic approaches to treat psychiatric

conditions related with hopelessness. Therapist and professionals dealing with psychological and mental health issues may consider inclusion of exercise and physical activity programs in their treatment options to counter the phenomenon of hopelessness. These approaches can be used alone or in conjunction with other treatment modalities for effective outcomes.

The negative relationship between hopelessness and physical activity emerged from this analytical study is indeed in accordance with our expectations. Previously, studies have demonstrated effectiveness of physical activity to improve the psychological conditions including depression, loneliness, suicidality, and self-injurious behaviors (Lew et al., 2019). These psychological conditions have been consistently shown to correlate with feelings of hopelessness (Lew et al., 2019). However, the question that what mechanisms are underlying the positive effect of physical activity on hopelessness remained unanswered in previous research. Studies in the future may address this question to fill the gap exists in present research.

Identified gaps and recommendations for future research

This analytical study identified many gaps on the relationship between physical activity and hopelessness. It is found that high quality studies with low risk of bias are lacking and that should be priority of future research. To provide the strong evidence, studies with RCT, CCT, longitudinal and cohort study designs need to be conducted. Precision in data collection procedures and data recoding contribute to the strength of the study findings. This primarily relies on valid and reliable data collection procedures and instruments. Few studies administered gold standard reported measures in cross-sectional studies. Future cross-studies should use self-reported valid and reliable physical activity measures i.e., "International Physical Activity Questionnaire", and valid and reliable hopelessness self-reported measures i.e., "Beck Hopelessness Scale" along with random sampling procedures including large sample size. For cohort, longitudinal, and interventional studies, objective measures including use of pedometer, accelerometer need to be essentially incorporate in future research.

In addition, this analytical study identified that no study was conducted in children population. Special attention should be given on the assessing effectiveness physical activity on level of hopelessness in individuals with psychological disorders including depression, loneliness, suicidal behaviors, and self-injuries tendencies. Such analysis is lacking in previous research of determining relationships between these two variables. Because the psychotic patients likely to more vulnerable to experience haplessness. More importantly, physical activity with different forms, types, intensity, duration, frequency, and various levels may interact differently with the conditions of hopelessness in participates with various age groups, health status, and genders. It is possibility that specific dose of certain form of physical activity may not exert identical effects on hopelessness in certain populations. Data from previous research on these directions is absent. This is also a big gap in the research area addressing link between hopelessness and physical activity. Lastly, it is evident that this analytical approach made significant contributions in the research addressing the issue of links between hopelessness and physical activity by identifying major gaps in previous research. This may contribute important developments in this area.

Conclusion:

In sum, the findings of this analytical study found consistent support for beneficial effects of physical activity to reduce hopelessness. However, this finding largely based on cross-sectional studies but based on few interventional studies or cohort studies. There are no conflicting results presented in the included studies. For more strong evidence more quality cross-sectional, cohort and interventional studies are suggested. The findings suggest that physical activity may be incorporated while planning and implementing strategies and interventions to deal with the problem of hopelessness in the current era. Physical activity may serve as non-invasive, non-pharmacological and low-cost therapeutic approach for the patients with conditions of hopelessness. Major gaps in existing evidence are identified and highlighted for future research directions.

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