



RESEARCH PAPER

Physical Activity and Sports to Prevent Suicidality among School-going Adolescents

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ABSTRACT

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The qualitative systematic review aims to present critical analysis regarding association of involvement in sports and physical activities with suicidal behaviors among school-going adolescents. Twelve major research databases were considered for search and following systematically identification, screening, and assessing eligibility, a total of thirty studies (29 cross-sectional and one longitudinal) were finally included in this review. This qualitative synthesis found weak support in favor of beneficial effects of involvement in sports and physical activities on reduction in suicidal behaviors for male school-going adolescents. However, these findings are less consistent for developing countries and minority groups in advanced countries. Findings regarding relationship of these variables for female school-going adolescents are inconclusive. Future studies with strong study designs and utilization of gold standard validated measuring instruments are essential for strong evidence particularly resolving controversial findings emerged for females

Introduction

During past few decades, students face wide range of stress during their school life in middle and high schools. Researchers have identified that these stressors may include academic (demanding coursework and homework, tests and exams burden, competition with classmates, lack of academic competencies, inability to cope with academic pressure), environmental (i.e., substance abuse, school bullying, adaptations to school environment, peer and parents pressure)

and family problems which include disturbed relations with parents, and siblings, lack of parents support, financial crisis in family and parental divorce (Anderson, Jimerson, & Whipple, 2005; Crean, 2004). It is evident that some students in school age have adequate cognitive and social resources to cope with these stressors and can avoid its harmful effects. Entering in middle and high schools is considered as nodal developmental time during which students face adaptation challenges that place further burden on their coping capabilities (Crean, 2004).

On the other hand, students with insufficient coping resources and competencies with increased stressors may face occurrence of various psychological disorders including anxiety, depression, hopelessness or sadness, loneliness, emotional distress (Al-Sughayr & Ferwana, 2012). Certain students are more sensitive to the stressors of school life that prone to more vulnerability to negative psychological effects that likely to increase the risk of suicidal tendencies (Crean, 2004). During few decades considerable research has focused on suicide behaviors such as suicide thoughts, suicide planning, and suicide attempts due to increased its prevalence among school-going students (Wasserman, 2016). Currently, suicide behavior among school students has become crucial issue among educationists, health professional, and psychologists. Social workers role is also very critical to prevent suicides and research results show that lack of proper research and knowledge on suicide make social workers less effective to deal with suicidal clients (Joe & Niedermeier, 2008). Past research showed decreasing trend of suicide in students aged 10-14 years globally but slightly increasing trend in girls (Kölves & De Leo, 2014). Whereas others revealed decreasing trends of suicide in both males and females adolescent's ages ranged from 15-19 years (Kölves & De Leo, 2016). Based on the data collected from 43 countries worldwide, another study documented 10.6% prevalence of suicide attempts in school-going adolescents (Vancampfort et al., 2019). The prevalence of suicide behavior was 44 % in students of middle and high schools experiencing risky behaviors (Wasserman, 2016). These findings indicate that suicide behavior has become a serious health issue among school-going adolescents.

Sports participation and physical activity can be considered important among the interventions and strategies proposed for prevention and treatment of suicide behaviors among school-going adolescents. It is evident that engagement in physical activity and sports during middle and high school period has numerous benefits related to psychophysical wellness for student adolescents. In particular, the psychosocial positive effects resulted from engaging in sports or exercise programs have direct connection with suicide behaviors in school going age. For example, these activities found to reduce stress, anxiety, and depression (Babiss & Gangwisch, 2009; Biddle & Asare, 2011; Kim, Han, Trksak, & Lee, 2014; Lee, Cho, & Yoo, 2013), loneliness (Pinto et al., 2019) and hopelessness (Harrison & Narayan, 2003; Kim et al., 2014) among school-going adolescents. In addition, sports, exercise or physical activity serve as buffer against development of psychological disorders through improving mood, enhancing self-

efficacy and increasing self-esteem, fostering pleasant feelings, as well as exerting positive effects on mental wellness and health among school-going adolescents (Eime, Young, Harvey, Charity, & Payne, 2013). Depression found to be among the most common psychiatric condition co-exist with suicide behaviors among school-going adolescents and also stressed school-based interventions programs for adolescents exhibiting risky behaviors (Siu, 2019).

If various psychiatric disorders co-exist with the development of suicidal behaviors among school-going adolescents, and engaging in sports or exercise programs found to reduce psychiatric problems and improve psychological health. Then, exercise may improve symptomology of suicidality. Although this idea is convincing, however, professionals and policy makers rely on evidence-based practices for implementations and effective outcomes.

This requires systematic and critical synthesis of existing research that examined effectiveness of physical activity and sports for reduction of suicide behavior among student adolescents. Therefore, this review sought to present qualitative synthesis of existing research showing association between these variables. The findings emerged from this review may help to provide useful guidance and suggestion for policy, practices and programs to counter suicide behaviors in this population.

Material and Methods

Criteria for excluding and including the publications

The selection and rejection criteria for publications for this systematic review was as presented below.

The criteria for consideration for inclusion were: 1) studies reported sufficient data regarding relationship of sports participation, exercise, physical activity, physical fitness, inactivity or sedentary behavior with suicidal behaviors. 2) Studies presented data regarding the variables of interest in adolescents studying in middle, high or secondary schools. 3) Studies reported both primary and secondary data. 4) Studies reported data in students with normal health and psychiatric disorders. 5) studies used any research design including, randomized control trial, controlled clinical trial, case control, cohort analytic, longitudinal, cohort with one group pre and post observations, applied and laboratory based/basic research, time series design, and cross-sectional design. 6) Investigation collected data or performed in any country. And 7) Studies published in peer review journals.

Exclusion criteria for this review involved: 1) studies presented insufficient data regarding variables of interest. 2) Studies reported data in adults and older people. 3) Unpublished research papers, thesis, dissertations, and conference

papers. 4) Studies published in languages others than English language. 5) Studies involved participants with intellectual and physical disabilities.

Search procedure

A systematic search of 12 research databases (Taylor & Francis, Cochrane Library, Springer Link, PubMed, JSTOR, SAGE Journals, Willey Online Library, Psychology and Behavioural Sciences Collection, PsycInfo, Academic Search, CINAHL, Sociological Collection) was performed in 2019. Three groups of keywords were used during systematic search of the related studies. Group one involved activity related keywords (i.e., exercise, sports, inactivity, physical activity, sedentary behavior, physical fitness) group two included keywords of suicide related keywords such as suicide, suicidal behavior, suicidality, and group three included adolescents, middle school, high school, school-going students. One keyword from each group was combined with the word AND to form the search terms to use in research databases.

Selection of Articles

After searching for potentially related studies in the research databases, duplicates of relevant publications were excluded. Full-texts of the suitable research publications were obtained. Subsequently, two expert assessors performed critically examinations to ensure meeting of exclusion and inclusion criteria. Following systematically searching, screening, and rigorous assessment of the studies based on inclusion exclusion criteria, 30 studies were finally selected for this review.

Data Extraction and Syntheses of Results

The summary of extracted data and study characteristics are presented in Table 1(A, B, and C) given below. Data was extracted from 30 selected studies regarding authors of the study, year/country of publication, and findings concerning variables of the interest of this article.

Table 1(A)
Summary of cross-sectional studies assessing relationship of physical activity with suicidality in school-going adolescents

Author/ Country	Results/ Findings
Unger, J. B. (1997). USA	1-Sports Participation and physical activity are negatively associated with suicidality in boys. 2- However, negative effect emerged for girls.
Randy M. Page , et al. (1998). USA	The likelihood of suicide attempts was significantly less in students participated in school sports.
Ferron, C. F. N. A., et al (1999). Switzerland	Students participated in sports activities reported decreased tendency to SA as compared with non-sports participant's students.

Pate, R. R., et al (2000).USA	The likelihood of SI was significantly lower in students involved in sports than non-sports participates students in both male and females.
Mazza, J. J., &Eggert, L. L. (2001). USA	Students with non-suicide risk reported significantly more participation in sports activities as compared with the students with suicide risk during weekdays (Monday to Friday).
Harrison, P. A., & Narayan, G. (2003).USA	Involvement in sports was linked to lower likelihood of suicidality among school students.

Table 1(B)

Summary of cross-sectional studies assessing relationship of physical activity with suicidality in school-going adolescents

Author/ Country	Results/ Findings
Brosnahan, J., et al (2004). USA	1-Increased total PA was related with decreased likelihood of SI in male and females. 2- participation in team sports, strength and toning, vigorous physical exercise, and total physical exercise were linked to reduced risk of thinking about suicide in both males and females Hispanic and non-Hispanic white participants.
Sabo, D., et al, (2005). USA	Sports participation was related with reduced suicide thoughts in students of both genders and decreased suicide planning in females.
Molina, J. A., & Duarte, R. (2006). USA	Lower sports participation was associated with higher rate of SA in boys but no significant difference was found for girls.
Tao, F. B., et al, (2007).China	Low and moderate level involvement in sports was associated with reduced suicide ideation.
Brown, D. R., et al (2007). USA	Exercises and involvement in sports were linked to decreased suicide behavior in both genders.
Taliaferro, L. A., et al (2008). USA	The level of suicide behavior was significantly lower in both females and males student athletes in comparison with non-athletes. Vigorous physical activity with high frequency was related with low risk of suicide behavior in males.
Babiss, L. A., &Gangwisch, J. E. (2009).USA	Rise in involvement in sports was linked to decreased odds of SI in both males and females students. These effects added by improving confidence and social assistance through sports participation.
Taliaferro, L. A., Rienzo, B. A.,	1-Male student athletes reported fewer suicide ideations than their non-athlete counterparts.

&Donovan, K. A. (2010). USA	2-Positive effect of sports participation for suicide behavior was absent for females students
Juan, W., et al (2010). China	Vigorous involvement in sports was inversely linked to suicide thinking in males.
Danice K. Eaton , et al (2011). USA	No effect of physical activity was found on suicide behavior among Hispanic/Latino female high school students.
Mata, A. D., et al (2012). USA	The level of suicide ideation was considerably lower in students who were involved in sports than those of non-participants students.
Lee, C. G., Cho, Y., &Yoo, S. (2013). Korea	Continuous vigorous sports related practices were negatively linked to suicide attempts for male and female students.
Cho, K. O. (2014). South Korea	Physical activity (low, moderate, vigorous) showed positive effect on suicide ideation and action towards suicide in both gender adolescent students of south Korea.
John F. Gunn III & David Lester (2014). USA	Team sports were associated with decreased SI.
Kim, S. M., Han, D. H., et al (2014).Korea	There was significantly negative association between suicide ideation and sports participation in male students. For females, significance difference was not observed.
Sibold, J., et al (2015). USA	Higher frequency of PA was related with less SI and SA in bullied adolescents.
Southerland, J. L., et al (2016) USA	Team sports participation likely to reduce suicidal behavior.
Jia, C. X., Li, S. B., et al (2016). China	1-Exercise frequency was significantly higher in students without SI than that of students with SI. 2-Exercise frequency was significantly negatively related with SI.
Lester, D. (2017). USA	1- Involvement in sports was linked to lower danger of suicide behavior in both males and females European Americans students. 2- sports participation had negative effect on suicide behavior in girls from minority social groups. 3- No positive effect of sports participation was found for minority male students.
Arat, G., et al (2017). South Asian Six countries	Physical activity showed negative effect for suicide behavior in Philippine and Sri lanka. In contrast, it was protective thing for suicidal behavior in the students in china.
Rodelli, M., et al (2018). Belgium	1-Increased frequency of MVPA was related with reduced suicide ideations. 2-Sports participation was not related with suicide ideations.
Vancampfort, D.,	Increased sedentary leisure time was related with increasing

et al (2019). 43 suicide attempts in school students. countries

Khan, A., et al Insufficient PA and high level of sedentary behavior was (2019). Bangladesh related with increased suicide behavior among students in Bangladesh.

Table 1(C)
Longitudinal Cohort Study

Author/ Country	Results/ Findings
Taliaferro, L. A., et al (2011). USA	Sports participation group (middle and high school) reported significantly lower rate of suicide ideation in comparison with participants in non-sports participants group.

Quality Appraisal of the Studies

Quality assessment of the admissible cross-sectional studies was performed by applying “The Newcastle-Ottawa Scale (NOS)” (Herzog et al., 2013; Wells et al., 2015). The quality appraisal for longitudinal research publication was performed based on “Quality Assessment Tool for Quantitative Studies” (B. Thomas, Ciliska, Dobbins, & Micucci, 2004; H. Thomas, Ciliska, & Dobbins, 2003). As far as the longitudinal study was concerned, it was based on the procedure and instructions provided in the dictionary and guide of this tool (Picot et al., 2012; Project, 2009).

Results and Discussion

Study Selection

Searching of 12 research databases yielded 5594 records in total. Following removing of duplicates, 3934 records remained. The remaining 3934 titles and abstracts were screened for fulfillment of eligibility criteria. This screening process yielded 106 articles. The full-text of those 106 research articles were further critically assessed for eligibility. Of these, 30 full-text studies were finally selected after critical appraisal and were included for qualitative synthesis in this review.

Study Characteristics

Among the 30 selected studies, 3 studies were conducted in China (Jia, Li, Han, & Bo, 2016; Juan, Xiao-Juan, Jia-Ji, Xin-Wang, & Liang, 2010; Tao et al., 2007) and 3 in South Korea (Cho, 2014; Kim et al., 2014; Lee et al., 2013), and one study in each country including Switzerland (Ferron, Narring, Cauderay, & Michaud, 1999), Belgium (Rodelli, De Bourdeaudhuij, Dumon, Portzky, & DeSmet, 2018), and Bangladesh (Khan, Uddin, & Kolbe-Alexander, 2019), whereas 19 studies were conducted in America (Babiss & Gangwisch, 2009; Brosnahan, Steffen, Lytle, Patterson, & Boostrom, 2004; Brown et al., 2007; Eaton et al., 2011; Gunn III & Lester, 2014; Harrison & Narayan, 2003; Lester, 2017; Mata et al., 2012; Mazza & Eggert, 2001; Molina & Duarte, 2006; Page, Hammermeister, Scanlan, & Gilbert,

1998; R. R. Pate, S. G. Trost, S. Levin, & M. Dowda, 2000; Sabo, Miller, Melnick, Farrell, & Barnes, 2005; Sibold, Edwards, Murray-Close, & Hudziak, 2015; Southerland, Zheng, Dula, Cao, & Slawson, 2016; Taliaferro, Rienzo, & Donovan, 2010; Taliaferro, Rienzo, Miller, Pigg Jr, & Dodd, 2008; Unger, 1997; Wells et al., 2015). Moreover, one article presented data collected from 6 middle income countries (Arat & Wong, 2017) and one study was performed in 48 countries (Vancampfort et al., 2019). This shows that majority of the studies (61.29%) presented data came from USA following China (9.67%), South Korea (9.67%), and Europe (6.45%). No study was conducted in African, Oceania, and in South and Central American geographical regions.

Among the 30 admissible studies, 29 used cross-sectional study design and one study used longitudinal cohort research design. Studies with randomized control trial, controlled clinical trial, case control, cohort analytic research designs are absent in this area. Only 5 (17.24%) studies used primary data in their research (Brosnahan et al., 2004; Mazza & Eggert, 2001; Rodelli et al., 2018; Taliaferro, Eisenberg, Johnson, Nelson, & Neumark-Sztainer, 2011; Tao et al., 2007), whereas data for the remaining 25 (83.33%) studies came from secondary sources such as nationally or internationally representative samples such as youth risk behaviors surveys and health surveys.

With regard to sports participation, the synthesis of results revealed that 17 studies showed positive effect (Babiss & Gangwisch, 2009; Brosnahan et al., 2004; Brown et al., 2007; Ferron et al., 1999; Gunn III & Lester, 2014; Harrison & Narayan, 2003; Kim et al., 2014; Mata et al., 2012; Mazza & Eggert, 2001; Molina & Duarte, 2006; Page et al., 1998; Russell R Pate, Stewart G Trost, Sarah Levin, & Marsha Dowda, 2000; Sabo et al., 2005; Southerland et al., 2016; Taliaferro et al., 2011; Taliaferro et al., 2010; Taliaferro et al., 2008), 2 studies yielded mix effect such as positive effect on boys and negative effect on girls (Lester, 2017; Unger, 1997), and one study reported no effects (Rodelli et al., 2018).

However, regarding physical activity, it was found that 9 studies reported positive effect (Brosnahan et al., 2004; Brown et al., 2007; Cho, 2014; Juan et al., 2010; Lee et al., 2013; Rodelli et al., 2018; Sibold et al., 2015; Taliaferro et al., 2008; Tao et al., 2007), two studies showed mix effect (Arat & Wong, 2017; Unger, 1997), and one study showed no effect (in females) (Eaton et al., 2011) of involvement in sports related activity on suicide behavior in school-going adolescents. In addition, other studies reported positive effect of exercise (Jia et al., 2016), and negative effect of inactivity/sedentary behaviors (Khan et al., 2019; Vancampfort et al., 2019) on suicidal behaviors in this population. No study reported the data regarding association of physical fitness and suicidal behavior in school-going adolescent population.

Only single study presented data regarding relationship of type of sports with suicidal behavior (Gunn III & Lester, 2014). This study showed overall

positive effect of participation in sports on suicidal behavior (Gunn III & Lester, 2014). However, sporting activities outside the sex norms (i.e., wrestling for females and dance/cheer leading for males) exerted negative effect on suicidal behavior. No study presented data regarding effects of team sports versus individual sports on suicidal behavior.

Risk of Bias

Among the 30 admissible studies, 29 studies were cross-sectional. Cross-sectional studies categorised as unsatisfactory rating were excluded from the qualitative synthesis. Studies rated as very good, good, or satisfactory category, were selected for this review. One study used longitudinal cohort design. This study had moderate quality ratings and, therefore, it is selected in the review.

This review aims to demonstrate qualitative synthesis of the existing evidence on the relationship of PA, sports engagement and inactivity/sedentary behavior on suicide behaviors among school-going adolescents. Thirty studies (29 cross-sectional and 1 longitudinal cohorts) were identified that met our criteria. Of the 29 cross-sectional studies, only one study was categorized as very good, whereas nineteen and ten studies were categorized as good and satisfactory quality ratings studies, respectively. One longitudinal study had moderate quality with respect to quality assessment procedure. Among the 29 cross-sectional studies, the results revealed that 24 studies exhibited positive effect and 2 studies showed no effect of physical activity or engaging in sports on suicidality among the population of our interest.

In cross-sectional studies some studies reported mix findings. For example, these studies showed a positive effect for boys and negative effect for girls (Unger, 1997), positive effect for white American males and females adolescents, negative for minority female students, and no effect for minority male students (Lester, 2017), negative effect in Philippine and Sri Lanka but positive effect in China (Arat & Wong, 2017). No effect of engaging in sporting or physical activities was found for girls in the research performed by Eaton et al. (2011), or positive effect for boys but no effect for girls in three studies conducted by Kim et al. (2014); (Molina & Duarte, 2006; Taliaferro et al., 2010). The longitudinal study also showed positive impact of sports related activities on suicidal behavior regardless of gender.

In general, these findings indicated that 7 (23.33 %) studies reported negative effect of physical activity or sports involvement on suicidal behavior for girls suggesting emergence of inconsistencies regarding relationship among the selected variables in this review. No study exhibited negative effect of sports related activity and sports engagement on suicidal behaviors in boys with the exception of one study that reported negative effects in Philippine and Sri Lanka (Arat & Wong, 2017), or no effect for minority boys in America (Lester, 2017). Overall, these data provided support in favor of positive impact of involvement in sport on reduction in suicidal behaviors for male school-going adolescents representing

majority social groups in developed countries. The findings regarding boys from minority social groups in advanced countries or living in developing countries are in consistent. However, findings concerning female students are inconsistent with regard to positive impact of PA and sports on suicidal behavior.

Although this review found good impact of PA and sports for male students of majority social groups in advanced countries, however, the strength of these findings seems weak because the support in favor of effectiveness of these variables primarily came from cross-sectional studies. Support from one longitudinal study is insufficient to strengthen the evidence. For strong evidence, findings from more studies with strong research designs such as randomized controlled trials, clinical control trials, analytical cohort, longitudinal, and two group cohort designs seems essential in future research.

These discussions lend suggestion for utilization of sports and physical activities as preventive tool for suicidality in male school-going adolescents specifically living in advanced countries. Policy makers and professionals in school education, health care settings, and school social workers need to consider sports, exercise and physical activities as preventive measures for suicidality in school-going adolescents. However, special attention and care is need to be given while selection of particular types, methods, and varieties of sports related activities those are more appropriate for girl school students and for youth in developing and low economy nations.

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