

Peer Review File

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Reviewer A

Comment 1: The authors highlight valid and important gaps in the literature that should be addressed both in theory and practice. When making recommendations to practical solutions that would help increase physical activity, and as a result, improve mental health, further justifications are required. i.e., what evidence do we have suggesting that those recommendations will prove successful?

Reply 1: Thank you for this comment. We added evidence related to the recommendations as suggested.

Changes in the text: While the physical activity interventions reviewed by Recchia et al. increased youths' physical activity levels, they were solely focused on the individual. There are multiple influences on youths' physical activity that remain underutilized. Throughout the week, physical education (PE) is a strategy to increase physical activity participation throughout the day (21). PE allows children to integrate movement into their typical day and learn the foundations of movement which can spur more physical activity throughout the day. For children and adolescents, adults are making the decisions that allow youths to have ample (or few) opportunities to participate in physical activity. Research indicates that through encouragement and behavior modeling, PE teachers have a positive effect on children and adolescents participating in physical activity (22). However, parents might have a bigger influence in adolescents' physical activity levels than PE teachers (22). Throughout a child or adolescent's life, parents have bountiful opportunities to model various health behaviors including physical activity participation. Furthermore, parents can provide encouragement and resources for a child to participate in after school physical activity opportunities such as sports. While adults are often the physical activity gatekeepers in a child's life and have a large influence on the child's physical activity levels, they are not the only influence to consider. Support and encouragement from friends impacts adolescents' physical activity levels (23). Overall, interpersonal relationships with parents, teachers, and friends impact a child's physical activity levels through modeling, encouragement, and enabling opportunities to be physically active. To create sustainable and scalable physical activity interventions, researchers should target multiple levels of the social ecological model (24). Furthermore, the facilitators (i.e., teachers, coaches, parents, researchers) should aim to provide physical activity opportunities that support the child's basic needs for autonomy, competence, and social connection (25). By doing so, children and adolescents can have multiple opportunities throughout their day to engage in physical activity and thereby experience benefits for mental health. See page 5-6, lines 109-135)

Comment 2: Minor, but please check orthography, grammar, and verb tenses throughout the

article.

Reply 2: We have checked the document to ensure all spelling, grammar, and verb tenses are correct.

Comment 3: Line 11: please include the year for Recchia et al.

Reply 3: Throughout the paper we added the year for Recchia et al.

Changes in the text: (2023) (See page 3, lines 5, 13, and 38; page 4, line 41 and 77; and page 5 line 85)

Comment 4: Line 49: I suggest including relevant information about the moderators that you mention. What were these moderating variables?

Reply 4: Recchia et al conducted a primary and secondary moderator analysis. Primary analysis included four a priori moderators and the secondary analysis examined intervention and participant characteristics.

Changes in text: Surprisingly, the treatment effect was not altered by total physical activity volume, participant's physical health status, whether the allocation and/or assessments were concealed, and whether the study was an RCT or not. (See page 3, lines 15-18)

Furthermore, Recchia et al. (2023) assess the risk of bias, perform a sensitivity analysis by recalculating the effect size after excluding potential outliers, and examine four a priori moderators (total physical activity volume, participants health status, whether the allocation and/or assessments were concealed, and whether the study was an RCT or NRCT) as well as secondary moderators (intervention and participant characteristics). (See page 4, line 43-48).

Comment 5: Line 87: Please correct author's name

Reply 5: We corrected author's name

Changes in text: Author's name has been corrected to Recchia (see page 4, line 77)

Comment 6: Line 106: "This is where making sustainable changes to habits and environments, and testing programs that can be delivered by parents or coaches or the children themselves, can ensure that the child or adolescent remains engaged in regular physical activity and reap long-term benefits for mental health." While I appreciate this as a suggestion for alternative physical activity regimens that may be more impactful and sustainable for children and adolescents, there is a need to elaborate on and justify that.

Reply 6: Thank you for this comment. We made adjustments to our text to address this.

Changes in text While the physical activity interventions reviewed by Recchia et al. increased youths' physical activity levels, they were solely focused on the individual. There are multiple influences on youths' physical activity that remain underutilized. Throughout the week, physical education (PE) is a strategy to increase physical activity participation throughout the day (21). PE allows children to integrate movement into their typical day and learn the

foundations of movement which can spur more physical activity throughout the day. For children and adolescents, adults are making the decisions that allow youths to have ample (or few) opportunities to participate in physical activity. Research indicates that through encouragement and behavior modeling, PE teachers have a positive effect on children and adolescents participating in physical activity (22). However, parents might have a bigger influence in adolescents' physical activity levels than PE teachers (22). Throughout a child or adolescent's life, parents have bountiful opportunities to model various health behaviors including physical activity participation. Furthermore, parents can provide encouragement and resources for a child to participate in after school physical activity opportunities such as sports. While adults are often the physical activity gatekeepers in a child's life and have a large influence on the child's physical activity levels, they are not the only influence to consider. Support and encouragement from friends impacts adolescents' physical activity levels (23). Overall, interpersonal relationships with parents, teachers, and friends impact a child's physical activity levels through modeling, encouragement, and enabling opportunities to be physically active. To create sustainable and scalable physical activity interventions, researchers should target multiple levels of the social ecological model (24). Furthermore, the facilitators (i.e., teachers, coaches, parents, researchers) should aim to provide physical activity opportunities that support the child's basic needs for autonomy, competence, and social connection (25). By doing so, children and adolescents can have multiple opportunities throughout their day to engage in physical activity and thereby experience benefits for mental health. (See page 5-6, lines 109-135)

Reviewer B

Comment 1: I recommend including youth in the title.

Reply 1: We have made changes to the title to better reflect the age group and topic area.

Changes in text: The title now reads: Physical activity and depressive symptoms in youth

Comment 2: Overall, many of the references are old. If possible, can it be replaced with more recent research?

Reply 2: We added five references that were published in 2023. In several instances we replaced older references with ones that were published in the last decade. We kept some older references that are considered hallmarks in the literature.

Changes in text: References #1-3, 13, 22-24 (See page 8-9)

Comment 3: Additionally, for young people, a large part of PA is school physical education.

Reply 3: We agree that PA in school often occurs during PE.

Changes in text: While the physical activity interventions reviewed by Recchia et al. increased youths' physical activity levels, they were solely focused on the individual. There are multiple influences on youths' physical activity that remain underutilized. Throughout the week, physical education (PE) is a strategy to increase physical activity participation throughout the day (21). PE allows children to integrate movement into their typical day and learn the

foundations of movement which can spur more physical activity throughout the day. For children and adolescents, adults are making the decisions that allow youths to have ample (or few) opportunities to participate in physical activity. Research indicates that through encouragement and behavior modeling, PE teachers have a positive effect on children and adolescents participating in physical activity (22). However, parents might have a bigger influence in adolescents' physical activity levels than PE teachers (22). Throughout a child or adolescent's life, parents have bountiful opportunities to model various health behaviors including physical activity participation. Furthermore, parents can provide encouragement and resources for a child to participate in after school physical activity opportunities such as sports. While adults are often the physical activity gatekeepers in a child's life and have a large influence on the child's physical activity levels, they are not the only influence to consider. Support and encouragement from friends impacts adolescents' physical activity levels (23). Overall, interpersonal relationships with parents, teachers, and friends impact a child's physical activity levels through modeling, encouragement, and enabling opportunities to be physically active. To create sustainable and scalable physical activity interventions, researchers should target multiple levels of the social ecological model (24). Furthermore, the facilitators (i.e., teachers, coaches, parents, researchers) should aim to provide physical activity opportunities that support the child's basic needs for autonomy, competence, and social connection (25). By doing so, children and adolescents can have multiple opportunities throughout their day to engage in physical activity and thereby experience benefits for mental health. See page 5-6, lines 109-135)

Comment 4: Moreover, in addition to their own decisions, adolescents are greatly influenced by their parents and home environment. Although it is not a deep description, a brief mention will enrich the content of this document.

Reply 4: This is a wonderful point. Please see changes in text above.

Changes in text: please see above

Reviewer C

Overall Comment: The editorial comment underscores the significant health benefits of regular physical activity, particularly in reducing depressive symptoms among children and adolescents, as supported by a systematic review. It emphasizes the urgent need for sustainable, low-cost interventions to promote physical activity, highlighting its critical role in addressing mental health concerns in youth. Additionally, the comment advocates for future research to focus on both acute and long-term effects of physical activity interventions on mental health outcomes, promoting a holistic approach to youth well-being.

Comment 1: However, while the title of this editorial comment suggests a discussion on the benefits of physical activity for health and happiness, the focus of the manuscript on explaining the meta-analysis by Recchia and colleagues does not align with this theme. While the meta-analysis provides valuable insights, the manuscript should devote more attention to discussing and introducing the broader health and happiness benefits of physical activity based on previous

literature. Relying solely on one meta-analysis may not sufficiently capture the comprehensive benefits of physical activity.

Reply 1: Thank you for taking the time to review our commentary. We agree that a single meta-analysis cannot capture all the benefits of physical activity, but that was not the purpose of this commentary. We were invited to provide commentary on Recchia and colleagues meta-analysis which reviewed physical activity interventions to alleviate depressive symptoms in children and adolescents. We provided strengths, weaknesses and areas for future research. In response to the reviewer's concern, in the introduction we added more information regarding beneficial effectiveness of physical activity on mental health. Additionally, we added a clarifying sentence for readers to understand the purpose of this editorial commentary. Finally, we added a 2023 meta-analysis discussing the effectiveness physical activity on mental health in adults.

Changes in text: The effect of physical activity on mental health is emerging, with a systematic review indicating that adults who are regularly physically active experience improvements in depression, anxiety, and psychological distress (3). (See page 3, lines 2-5)

The purpose of this editorial commentary is to review the strengths and weaknesses of Recchia et al. (2023) and provide recommendations for future research. (See page 3, Lines 8-10)

Comment 2: The Introduction should provide a brief overview of the importance of physical activity for health and happiness and introduce the focus of the editorial comment and its relevance in the current context (youth and children).

Reply 2: Thank you for this advice, we have added to the introduction. We also changed the title per the reviewer's suggestion so that it aligns with the Recchia article and with the text of our article focused on physical activity and mental health, with a focus on depressive symptoms. Changes in text: Regular engagement in physical activity results in a lower risk of obesity during childhood (1) and reduced risk for cardiovascular disease across the lifespan (2). The effect of physical activity on mental health is emerging, with a systematic review indicating that adults who are regularly physically active experience improvements in depression, anxiety, and psychological distress (3). (See page 3, lines 1-5)

Comment 3: Furthermore, the literature review section should discuss the latest research findings or landmark studies that highlight the benefits of physical activity on various aspects of health, including physical, mental, and emotional well-being. It may be essential to include evidence supporting the positive effects of physical activity on reducing the risk of chronic diseases, improving mood, enhancing cognitive function, and promoting overall quality of life. In this process, the authors may need to delve into the specific mental health benefits associated with regular physical activity, such as reducing stress, anxiety, and depression. Additionally, provide insights from research studies or meta-analyses that demonstrate the effectiveness of physical activity interventions in alleviating depressive symptoms and improving overall mental well-being. (The current version discusses only this part).

Reply 3: We changed the title to physical activity and depressive symptoms in youth and specified that this is a commentary on the Recchia meta-analysis specifically focused on

depressive symptoms. In response to the reviewer, we added two new systematic reviews discussing the effects of physical activity on obesity risk in children as well as mental health in adults. Furthermore, we added a scoping review discussing how physical activity can prevent cardiovascular disease across the lifespan. As the purpose of this study was to provide commentary on Recchia, we did not perform a comprehensive review of health indicators not studied in the Recchia meta-analysis.

Changes in text: Regular engagement in physical activity results in a lower risk of obesity during childhood (1) and reduced risk for cardiovascular disease across the lifespan (2). The effect of physical activity on mental health is emerging, with a systematic review indicating that adults who are regularly physically active experience improvements in depression, anxiety, and psychological distress (3). (See page 3, lines 1-5)

Comment 4: Then, it may be essential to highlight how the benefits of physical activity extend across various moderators (age, FITT principles, contexts, etc.) while addressing common barriers and challenges that hinder individuals from engaging in regular physical activity, such as lack of time, access to resources, or motivation. The authors can offer potential strategies or interventions to overcome these barriers and promote physical activity adoption in this section.

Reply 4: Thank you for this comment. We made appropriate edits to our document.

Changes in text: The beneficial effects associated with physical activity participation is observed regardless of type (aerobic vs. anaerobic), intensity (high vs. low), physical environment (indoors vs outdoors, and social context (individual vs group) (12, 13). Recchia and colleagues only focused on aerobic exercise interventions, so it would be beneficial to further explore how specific types of physical activity, like muscle- and bone-strengthening activities, affect depressive symptoms in children (See page 4, lines 68-74)

Comment 5: Finally, the authors can conclude this manuscript by summarizing the key points discussed in the editorial comment, emphasizing the critical role of physical activity in promoting health and happiness.

Reply 5: This is a wonderful suggestion, and we made the appropriate changes.

Changes in text: In summary, Recchia and colleagues conducted a timely and rigorous systematic review and meta-analysis of the evidence based on physical activity interventions to alleviate depressive symptoms in youth, particularly for adolescents and for those with pre-existing depressive symptoms. Despite these promising results, the studies included in this systematic review are best classified as exercise interventions not physical activity interventions. Thus, these findings stress the importance of regular exercise programming for adolescents' psychological health. (See pages 6, lines 136-141)

Comment 6: In conclusion, the summary of one meta-analysis may not fully achieve the intended purpose of the editorial comment. A more extensive review of the literature to explore the implications of the health and happiness benefits of physical activity may be necessary.

Reply 6: We thank you again for all of your suggestions. We did work to add a few more

references/overview of the literature, but ultimately did not seek to do a comprehensive review.
We would be happy to add more, should the editor request.