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## Title

### ***Meeting 24-h movement behavior guidelines is linked to academic engagement, psychological functioning, and cognitive difficulties in youth with internalizing problems***

## Abstract

Background: This study aimed to investigate associations of meeting 24-h movement behavior (24-HMB: physical activity [PA], screen time [ST] in the school-aged youth, and sleep) guidelines with indicators of academic engagement, psychological functioning, and cognitive function in a national representative sample of U.S. youth. Methods: In this cross-sectional study, 1794 participants aged 6 to 17 years old were included for multivariable logistic regression to determine the above-mentioned associations, while adjusting for sociodemographic and health covariates. Results: The proportion of participants who met 24-HMB guideline(s) varied greatly (PA+ ST+ sleep = 34 [weighted 1.17 %], PA + ST = 23 [weighted 1.72 %], PA + sleep = 52 [weighted 2.15 %], PA = 34 [weighted 2.88 %], ST = 142 [weighted 7.5 %], ST+ sleep = 209 [weighted 11.86 %], sleep = 725 [weighted 35.5 %], none = 575 [weighted 37.22 %]). Participants who met ST guideline alone and integrated (ST + Sleep and ST + sleep + PA) guidelines demonstrated the consistently beneficial associations with learning interest/curiosity, caring for school performance, completing required homework, resilience, cognitive difficulties, self-regulation ( $p < 0.05$ ). Conclusion: Meeting 24-HMB guidelines in an isolated or integrative manner was associated with improved academic engagement, psychological functioning, and reduced cognitive difficulties. These findings highlight the importance of the promotion of 24-HMB guidelines in youth with internalizing problems. Future longitudinal studies are needed to investigate whether changes or modifications of meeting specific 24-HMB guidelines (especially ST) is beneficial for youth with internalizing problems. © 2024 Elsevier B.V.

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## Authors

Gao Y.; Yu Q.; Schuch F.B.; Herold F.; Hossain M.M.; Ludyga S.; Gerber M.; Mullen S.P.; Yeung A.S.; Kramer A.F.; Taylor A.; Schinke R.; Cheval B.; Delli Paoli A.G.; Ng J.L.; Van Damme T.; Block M.; Cunha P.M.; Olds T.; Haegele J.A.; Zou L.

## Author full names

Gao, Yanping (58146966100); Yu, Qian (57216131400); Schuch, Felipe B. (14016488400); Herold, Fabian (56845172300); Hossain, M. Mahbub (57207311791); Ludyga, Sebastian (55413523800); Gerber, Markus (24721244300); Mullen, Sean P. (36728084700); Yeung, Albert S. (24315287900); Kramer, Arthur F. (57203070893); Taylor, Alyx (8531548100); Schinke, Robert (13005229400); Cheval, Boris (56324621500); Delli Paoli, Anthony G. (58816871100); Ng, Jonathan Leo (57216459111); Van Damme, Tine (56520172900); Block, Martin (7201556360); Cunha, Paolo M. (57196703787); Olds, Timothy (6701613775); Haegele, Justin A. (56158491700); Zou, Liye (57192235862)

## Author(s) ID

58146966100; 57216131400; 14016488400; 56845172300; 57207311791;  
55413523800; 24721244300; 36728084700; 24315287900; 57203070893;  
8531548100; 13005229400; 56324621500; 58816871100; 57216459111;  
56520172900; 7201556360; 57196703787; 6701613775; 56158491700;  
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## Affiliations

Body-Brain-Mind Laboratory, School of Psychology, Shenzhen University, Shenzhen, 518060, China; Faculty of Education, University of Macau, Macau, 999078, China; Department of Sports Methods and Techniques, Federal University of Santa Maria, Santa Maria, Brazil; Faculty of Health Sciences, Universidad Autónoma de Chile, Providencia, Chile; Research Group Degenerative and Chronic Diseases, Movement, Faculty of Health Sciences Brandenburg, University of Potsdam, Potsdam, 14476, Germany; Department of Decision and Information Sciences, C.T. Bauer College of Business, University of Houston, TX, United States; Department of Sport, Exercise & Health, University of Basel, Basel, Switzerland; Department of Kinesiology and Community Health, College of Applied Health Sciences, University of Illinois Urbana-Champaign, United States; Depression Clinical and Research Program, Massachusetts General Hospital, Boston, MA, United States; Center for Cognitive and Brain Health, Northeastern University, Boston, 02115, MA, United States; Beckman Institute, University of Illinois at Urbana-Champaign, Champaign, 61820, IL, United States; School of Rehabilitation, Sport and Psychology, AECC University College, Bournemouth, BH5 2DF, Ireland; School of Kinesiology and Health Sciences, Laurentian University, Sudbury, P3E 2C6, ON, Canada; Department of Sport

---

Sciences and Physical Education, Ecole Normale Supérieure Rennes, Bruz, France; Laboratory VIPS2, University of Rennes, Rennes, France; Department of Kinesiology and Health, Rutgers University, New Brunswick, NJ, United States; Department of Health, Physical Education, and Sport, School of Education, College of Design and Social Context, RMIT University, Melbourne, VIC, Australia; Research Group for Adapted Physical Activity and Psychomotor Rehabilitation, Department of Rehabilitation Sciences, KU Leuven, O&N IV Herestraat49, Mailbox 1510, Leuven, 3000, Belgium; UPC KU Leuven, Kortenberg, Leuven, Belgium; Leuven Autism Research (LAuRes), KU Leuven, Leuven, Belgium; Department of Kinesiology, University of Virginia, Charlottesville, 22904-4407, VA, United States; Metabolism, Nutrition, and Exercise Laboratory, Londrina State University, Londrina, Brazil; Alliance for Research in Exercise, Nutrition and Activity (ARENA), Allied Health and Human Performance, University of South Australia, Adelaide, SA5001, Australia; Department of Human Movement Sciences, Old Dominion University, United States

## **Authors with affiliations**

Gao Y., Body-Brain-Mind Laboratory, School of Psychology, Shenzhen University, Shenzhen, 518060, China; Yu Q., Body-Brain-Mind Laboratory, School of Psychology, Shenzhen University, Shenzhen, 518060, China, Faculty of Education, University of Macau, Macau, 999078, China; Schuch F.B., Department of Sports Methods and Techniques, Federal University of Santa Maria, Santa Maria, Brazil, Faculty of Health Sciences, Universidad Autónoma de Chile, Providencia, Chile; Herold F., Body-Brain-Mind Laboratory, School of Psychology, Shenzhen University, Shenzhen, 518060, China, Research Group Degenerative and Chronic Diseases, Movement, Faculty of Health Sciences Brandenburg, University of Potsdam, Potsdam, 14476, Germany; Hossain M.M., Department of Decision and Information Sciences, C.T. Bauer College of Business, University of Houston, TX, United States; Ludyga S.,

---

Department of Sport, Exercise & Health, University of Basel, Basel, Switzerland; Gerber M., Department of Sport, Exercise & Health, University of Basel, Basel, Switzerland; Mullen S.P., Department of Kinesiology and Community Health, College of Applied Health Sciences, University of Illinois Urbana-Champaign, United States; Yeung A.S., Depression Clinical and Research Program, Massachusetts General Hospital, Boston, MA, United States; Kramer A.F., Center for Cognitive and Brain Health, Northeastern University, Boston, 02115, MA, United States, Beckman Institute, University of Illinois at Urbana-Champaign, Champaign, 61820, IL, United States; Taylor A., School of Rehabilitation, Sport and Psychology, AECC University College, Bournemouth, BH5 2DF, Ireland; Schinke R., School of Kinesiology and Health Sciences, Laurentian University, Sudbury, P3E 2C6, ON, Canada; Cheval B., Department of Sport Sciences and Physical Education, Ecole Normale Supérieure Rennes, Bruz, France, Laboratory VIPs2, University of Rennes, Rennes, France; Delli Paoli A.G., Department of Kinesiology and Health, Rutgers University, New Brunswick, NJ, United States; Ng J.L., Department of Health, Physical Education, and Sport, School of Education, College of Design and Social Context, RMIT University, Melbourne, VIC, Australia; Van Damme T., Research Group for Adapted Physical Activity and Psychomotor Rehabilitation, Department of Rehabilitation Sciences, KU Leuven, O&N IV Herestraat49, Mailbox 1510, Leuven, 3000, Belgium, UPC KU Leuven, Kortenberg, Leuven, Belgium, Leuven Autism Research (LAuRes), KU Leuven, Leuven, Belgium; Block M., Department of Kinesiology, University of Virginia, Charlottesville, 22904-4407, VA, United States; Cunha P.M., Metabolism, Nutrition, and Exercise Laboratory, Londrina State University, Londrina, Brazil; Olds T., Alliance for Research in Exercise, Nutrition and Activity (ARENA), Allied Health and Human Performance, University of South Australia, Adelaide, SA5001, Australia; Haegele J.A., Department of Human Movement Sciences, Old Dominion University, United States; Zou L., Body-Brain-Mind Laboratory, School of Psychology, Shenzhen University, Shenzhen, 518060, China

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## **Correspondence Address**

L. Zou; Body-Brain-Mind Laboratory, School of Psychology, Shenzhen University, Shenzhen, 518060, China; email: liyezou123@gmail.com

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