Pharmacology

Research Article

Pharmacology 2024; Volume 109, Issue 1: 158-167

Received: July 18, 2023
Accepted: Dec 17, 2023
Published online: Feb 15, 2024

Assessment of the Influence of Physical Activity, Social Bonds, and Support Networks on Health Behaviors Among Elderly Individuals

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Keywords: physical activity, support network, social bond, health behavior.

Abstract

Objective: The best strategy to increase physical and mental health in older persons is by participating in group physical exercise, which also benefits relationships and health. This study used a multi-component exercise program as an intervention to better understand how physical activity, social bonds, and support networks relate to elderly individuals' expressive ability for health behavior.

Methods: This research included 100 healthy adults (50 men and 50 women, average ages 76.57±1.46 and 74.73±1.68 respectively) over the age of 65. Participants in an eight-week multi-component physical activity program completed the Senior Physical Fitness Test for Older People, the Physical Activity, Social Bond, and Support Network Questionnaire for elderly people, and the Health Behavior Inventory for Older Adults before and after the intervention.

Results: The study's findings suggested that SFT data in older men and women might aid in strengthening the muscles in both the lower and upper extremities and enhancing balance. Every participant might exercise for more than 30 minutes, mostly outdoors, a minimum of 3 days a week with the goal to refrain from using cigarettes, alcohol, or drugs before the HBI test.

Conclusions: In this research, older people's health behaviors were most significantly predicted by their support network and social bond behaviors, which also had a strong explanatory power on older adults' health behaviors. Exercise behavior came in second. Last but not least, it was discovered that the multi-component exercise program's treatments had a good impact on older persons' exercise

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behavior, social support, and social cohesiveness, as well as their overall health behavior. The findings of this research are valuable in encouraging older persons to participate in outdoor group exercise since doing so improves their mental and physical health by providing social chances.

Introduction:

A society is deemed to be "super-aged" by the World Health Organization (WHO) when the percentage of individuals over 65 amounts to twenty percent of the overall population [1]. With increasing age, physical activity levels decrease and health conditions worsen, and some older persons with ongoing medical conditions may stop being active [2]. Physical exercise is good for your health, regardless of whether you have a chronic illness, according to some research [3]. The aging of the world's population is a phenomenon and older individuals are more concerned about their health [4]. From a preventive medicine perspective, older persons' healthy exercise behaviors are essential to maintaining positive behavior and may help delay aging-related illnesses or impairments [5]. The World Health Organization has suggested that the lack of exercise intensity and duration in older persons is an issue for their health behavior [6].

The idea of healthy behavior, exercise behavior, and its connections to older persons are covered in this text. Various behaviors that support physical and mental well-being and illness prevention are considered to be health behaviors. Exercise behavior, broadly speaking, refers to physical activity that uses up energy and is done by skeletal muscles during leisure time, housekeeping, employment, etc. In a more restrictive definition, it refers to physical activity done for fun, which requires both exercise duration and intensity. According to WHO guidelines, the passage specifies exercise behavior for older persons. Through a multi-component exercise program, the research hopes to highlight the value of physical activity for older persons and foster independent exercise behavior. Age, gender, level of education, relationship status, smoking, and present living situations are among the variables that influence older individuals' exercise behavior. It is hypothesized that exercise behavior is adversely associated with smoking and favorably correlated with healthy body weight and nutritional consumption. Exercise may also improve mental health by reducing anxiety, stress, and depression's breadth and depth. The research makes group sports opportunities available and assesses their effects on older individuals' health behaviors through a multi-sport intervention program. The promotion of healthy behaviors in older individuals depends on social cohesiveness and support.

Methods:

This research looked at how a multi-component exercise program affected exercise behavior, social bond, support network, and health behavior among Lahore City's healthy older individuals over the age of 65. The time period for this study was from January 2023 to March 2023. Because there was no control group or randomization, the research used a one-group pretest-posttest design. Instead, factors that may have impacted the experiment's findings were restricted and under control. To encourage social cohesiveness and connection among elderly persons, the intervention measures included an 8-week multi-component fitness program that included walking, strength training, and yoga. This program was delivered by participating study members utilizing a group exercise approach.

Through poster advertising for the college's physical exercise center, 100 healthy older persons over the age of 65 were enrolled in the research, with an equal number of men and women. Since there was no discernible variation in the ages of the participant’s male and female counterparts, their ages were homogenous. Everyone who participated got an athletic bottle for participating part, and the whole event was free. Demographic data were gathered, including age, gender, level of education, relationship status, smoking status, and current housing arrangements. Participants who were willing to abstain from using supplements that might enhance muscle or sarcopenia throughout the trial and had no history of orthopedic or cardiac illness, as well as no regular exercise regimen, were

included. An informed permission form that adhered to ethical and scientific standards was signed by each participant.

The 8-week, multi-component exercise program included courses scheduled from Monday through Friday for two hours each. It was based on the Physical Activity Guidelines for Americans (PAGA). The program's exercise intensity was measured in metabolic equivalents (MET), with a moderate exercise intensity ranging between 3.0 and 5.9 METs. It was an aerobic workout, which causes the heart rate to rise and muscles to utilize oxygen more effectively.

The "Physical Activity, Social Bond, and Support Network Scale" for senior citizens were created in the research, coupled with the "Healthy Behavior Questionnaire for Older Adults." To assess the program's impact on older persons' physical activity, social bonds, support network, and health behavior, a questionnaire was given before and after an 8-week exercise program. To determine the explanatory power of the health of elderly people behaviors, factors such as physical activity, social connection, and support system were examined.

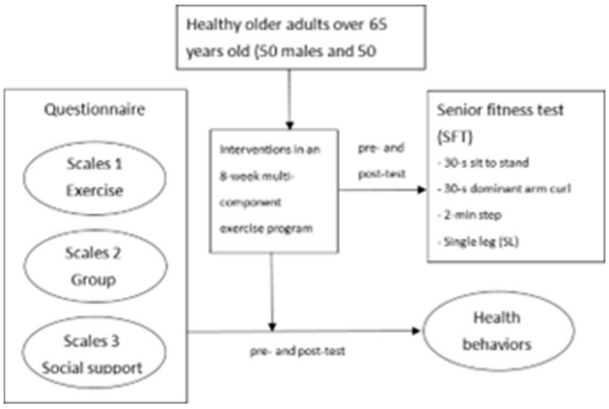

Figure 1: Research Design

Results:

As shown in Table 1, the research covered sociodemographic factors such as level of education, gender, age, relationship status, smoking behaviors, and living conditions. Women and men did not differ significantly in terms of mean age or marital status. The majority of males had education beyond high school, but the majority of girls had only completed elementary or junior high school. This considerable discrepancy in educational attainment was apparent. Male and female smoking behaviors did vary significantly, however, the majority of both sexes were either non-smokers or ex-smokers. Males were more likely than females to live alone, although both genders were most often found to be living with a spouse or children.

Table 1: The participants' demographic information

		Female		Male			
	Variables	%	$\bar{X} \pm$ **SD**	%	$\bar{X} \pm$ **SD**	**p**	**t-stat**
	Age (years)		74.73± 1.68		76.57 ± 1.46	0.23	0.87
Relationship Status	Widowed	16		14		0.52	-0.48
	Divorce	10		10		0.81	0.06
	Unmarried	10		6		0.12	-1.56
	Married	64		70		0.09	1.73
Level of Education	College and above	4		16		0	8.74
	High school	20		54		0	14.85
	Secondary	50		22		0	-16.37
	Primary	26		8		0	-11.42
Smoking	Infrequent smoker	0		8		0	7.49
	Past smoker	20		48		0	6.52
	No	76		24		0	-9.13
	Yes	4		20		0.14	1.37
Living conditions	With Kids	22		16		0.06	-2.23
	With Wife/Husband and Kids	28		22		0.07	-2.17
	With Wife/Husband	42		46		0.09	1.95
	Alone	8		16		0	6.16

Since both groups in this research were equally spaced out, post-test PASBSN and HBI variables for males and females were evaluated using Pearson product-moment correlation analysis. According to Table 2, the correlation coefficients between the PASBSN and HBI post-test variables for men ranged between 0.59 and 0.92, attaining a substantial moderate to high connection. After eight weeks of the multi-component fitness program, the PASBSN and HBI showed a positive medium-high connection. The highest correlation coefficient, 0.92 (p-value less than 0.05), was found between the "physical activity" components of the PASBSN and the HBI. The 2nd highest correlation value was 0.91 (p-value < 0.05) between the HBI's "emotion and stress" component and the PASBSN's "support network" component.

Table 2: Examination of the relationships between the HBI and PASBSN in men after different post-test variables.

			PASBSN		
	Factors		1	2	3
			Support Network	Social Bond	Physical Activity
HBI	1	Smoking and drug	0.71	0.74	0.65
	2	Physical activity	0.83	0.81	0.92
	3	Emotion and stress	0.91	0.73	0.76
	4	Medical and healthcare	0.76	0.61	0.78
	5	Healthy diet	0.59	0.63	0.69

The correlation value varied from 0.51 to 0.88 in this study comparing the PASBSN and HBI components for females, showing a substantial moderate to high link as seen in Table 3. After an 8-week, multi-component exercise program, the PASBSN and HBI showed a positive, medium-high connection. The greatest correlation coefficient of 0.88 (p-value less than 0.05) was found between the "Physical Activity" component of PASBSN and the "Physical Activity" component of HBI. The HBI component for "medical and healthcare" and the PASBSN component for "Support Networks" had the second-highest correlation coefficient, 0.87 (p-value less than 0.05).

Table 3: Examination of the relationships between the HBI and PASBSN in women after different post-test variables.

			PASBSN		
	Factors		1	2	3
			Support Network	Social Bond	Physical Activity
HBI	1	Smoking and drug	0.55	0.57	0.51
	2	Physical activity	0.86	0.83	0.88
	3	Emotion and stress	0.73	0.79	0.79
	4	Medical and healthcare	0.87	0.74	0.83
	5	Healthy diet	0.66	0.58	0.81

After the Pearson product-moment correlation analysis showed a significant correlation between the HBI and PASBSN elements in elderly males and females, the PASBSN variables were used to improve the explanatory power of the dependent variable (HBI). The statistical validity of the regression pattern was checked first in the regression analysis. The Durbin-Waston test result was 1.613 and the F-test results for men and women revealed substantial distinctions between the independent and dependent variables: male F=87.354 (p-value less than 0.01) and female F = 95.173 (p-value less than 0.01). Male and female gender differences demonstrated the independence of the three components' data. The ability of multiple regression to describe the health behavior of the dependent variable was examined using the forced entry method (the independent variable included in the regression model).

The male PASBSN findings were able to significantly explain the HBI, with the explained variance being R2=8.4% (p0.01). The estimated value of exercise behavior was the independent variable with the largest influence on health behavior (β=0.716, p-value=0.01), followed by social support (β=0.625, p-value=0.01) and social cohesiveness (β=0.598, p-value=0.01). According to Table 4, the three independent factors had a favorable effect on the health behavior of older males since all of their -values were positive.

Table 4: Results of the examination of linear regression in men

Variables	Beta	R	R-Sqrd	Adjusted R-Sqrd	p-value
Social Bond	0.598				< 0.001
Support Network	0.625				< 0.001
Physical Activity	0.716	0.827	0.684	0.683	< 0.001

The female PASBSN findings had a considerable degree of explanatory power for the HBI; the explained variance was R2 = 78.7% (p-value<0.01). The projected value of exercise behavior, which was one of the independent factors, had the biggest effect on health behavior (β= 0.743, p-value<0.01), followed by social bond (β= 0.697, p-value<0.01) and support network (β= 0.641, p-value<0.01). As demonstrated in Table 5, the three independent factors had a favorable effect on the health behavior of older female adults since their -values were all positive. As a result, Hypothesis 2 (exercise behavior, social cohesiveness, and social support may efficiently anticipate the health behavior of older persons following a multi-sport program intervention) was verified and approved.

Table 5: Results of the examination of linear regression in women

Variables	Beta	R	R-Sqrd	Adjusted R-Sqrd	p-value
Social Bond	0.697				< 0.001
Support Network	0.641				< 0.001
Physical Activity	0.743	0.887	0.787	0.786	< 0.001

Discussions:

In this study on sociodemographic characteristics in elderly people, it was shown that men and women differ considerably in their degrees of education and health behaviors. As shown in a study, elderly people who are highly educated and fatigued may engage in healthier behaviors, particularly when they develop new persistent illnesses and begin to alter their behavior [7]. Multiple research studies have also verified the link between education level and engaging in healthy behaviors [8]. men and female smokers had considerably different smoking patterns, which was in line with much other research [9]. In addition, most older smokers were men [10]. 72% of the non-smokers and ex-smokers older individuals in this research were men, and 96% were women. This finding revealed that older males were more likely to give up smoking than older women and that older men were more likely to have chronic illnesses than older women [11].

After eight weeks of the multi-component fitness program treatment for older people, the physical activity, social bond, and support network questionnaire showed that there were significant differences between men and women's pre- and post-test values for each category. When it comes to social bonds, elderly people can strengthen their ties to their neighbors by getting outside, making their neighborhood the center of their lives, promoting respect for the community's various cultures, winning over neighbors and friends, and belonging to fixed groups (such as through volunteer work and religion) as a way to make a lot of friends and give back to the area. This research demonstrated that

older persons, including those who live alone, strengthen their focus via communal life. They may also gain mental by engaging in community activities like volunteering or participating in religious activities. This outcome is in line with a number of other research [12,13,14]. In the context of support networks, the findings demonstrated that older persons who take part in group activities get respect, attention, and care, building their social networks and minimizing social isolation [15]. This was in line with a previous study, which urged senior citizens to engage in community events and form positive interpersonal connections [16]. The presence of close family members, like kids or spouses, helps elderly people retain excellent mental health [17]. Numerous studies have shown that older males express higher pleasure and get greater encouragement from their spouses [18]. In addition, older women report feeling better when they get help from their kids or colleagues [19].

The results of the examination of the correlations between the PASBSN and HBI components for men and females revealed that both sexes concurred that the association between Physical activity (PASBSN) and regular physical activity (HBI) was the highest. Second, "social support" was assessed by men as having the 2nd-highest connection with "emotion and stress" (HBI), according to the PASBSN. For females, "social support" (PASBSN) correlated with "medical and healthcare" (HBI) in second place. Older individuals were given a number of various exercises to complete in the multi-component exercise program intervention, each having a distinct impact on the activation of body muscles. This workout intervention was worthwhile. Physical exercise has an effect on older individuals' regular physical activity, according to the evidence [20]. Regarding the connection between social support, emotion, and stress, prior research has demonstrated that social support can lower older adults' blood pressure [21], improve one's capacity to deal with stress [22], as well as relieve stress and lessen depression [23]. A person's social network directly affects how they are treated medically as they age, and community programs may improve their physical and mental health and alleviate the burden of care [24]. The research by Asante et al. found a clear correlation between social support and elderly people's health care. For instance, older individuals may be more inclined to accept treatment if they see the doctor-patient relationship as trustworthy and helpful [25].

The regression analysis's findings showed that the PASBSN could successfully explain older persons' health behavior in 68.4% of men (R2=0.684) and 78.7% of women (R2=0.787). The largest predictors of older individuals' health behaviors, social support, and social cohesiveness, were followed by exercise behavior, which had the highest explanatory power for both male and female older adults. Numerous research has shown the usefulness of these three variables in predicting health-related behavior. A research that looked at the relationship between support networks and exercise in older people found that individuals who had larger support networks, especially from family members, were more likely to exercise [26]. Social cohesiveness improved health behaviors by lowering the likelihood of smoking [26]. Additionally, it was shown that older persons were more willing to exercise with one another, hence boosting health, and the better their social cohesiveness (feeling of safety and trustworthiness) [27]. Individuals have shown an active preference for working out with other people their own age, and their exercise adherence increased, according to the findings of the group joint exercise [28]. The role of neighborhood social cohesiveness in encouraging healthy behaviors in older individuals is examined by a study [29]. In line with several previous research [30] in the same field, Table 5 demonstrates that the three characteristics examined in this study were capable of accurately predicting health behaviors.

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Conclusions:

In this research, professionally trained staff members oversaw an eight-week multi-component exercise program for seniors, assessed the seniors' physical fitness, and administered the PASBSN and HBI questionnaires to each participant. The findings showed that the older persons were able to complete the 8-foot up-and-go (2.44 meters), 30-second dominant arm curl, 2-minute walk, and single-leg activities thanks to the multi-component exercise program treatments. The program reduced the risk of falls in older persons by enhancing balance and strengthening the muscles in the upper and lower extremities. With favorable effects on health behaviors, exercise interventions have a good impact on older individuals' exercise behavior, support network, and social bond. It has been advised that older individuals' physical activity levels be kept moderate, and that group exercise be practiced outside, in order to foster social networking possibilities that are good for mental health and therefore to promote mental as well as physical wellness. To promote mental health and boost social involvement, a diversified group exercise program for older persons with various physical and mental disorders should be implemented in the future. This will raise the likelihood of happy and healthy aging.

References:

1. Oliveira, M. R., Sudati, I. P., Konzen, V. D. M., de Campos, A. C., Wibelinger, L. M., Correa, C., ... & Borghi-Silva, A. (2022). Covid-19 and the impact on the physical activity level of elderly people: a systematic review. *Experimental gerontology*, *159*, 111675.
2. Whitaker, K. M., Hung, P., Alberg, A. J., Hair, N. L., & Liu, J. (2021). Variations in health behaviors among pregnant women during the COVID-19 pandemic. *Midwifery*, *95*, 102929.
3. Goodyear, V. A., Boardley, I., Chiou, S. Y., Fenton, S. A., Makopoulou, K., Stathi, A., ... & Thompson, J. L. (2021). Social media use informing behaviours related to physical activity, diet and quality of life during COVID-19: a mixed methods study. *BMC Public Health*, *21*, 1-14.
4. Van Orden, K. A., Bower, E., Lutz, J., Silva, C., Gallegos, A. M., Podgorski, C. A., ... & Conwell, Y. (2021). Strategies to promote social connections among older adults during "social distancing" restrictions. *The American Journal of Geriatric Psychiatry*, *29*(8), 816-827.
5. Duan, Y., Shang, B., Liang, W., Du, G., Yang, M., & Rhodes, R. E. (2021). Effects of eHealth-based multiple health behavior change interventions on physical activity, healthy diet, and weight in people with noncommunicable diseases: systematic review and meta-analysis. *Journal of Medical Internet Research*, *23*(2), e23786.
6. Pérez, L. M., Castellano-Tejedor, C., Cesari, M., Soto-Bagaria, L., Ars, J., Zambom-Ferraresi, F., ... & Inzitari, M. (2021). Depressive symptoms, fatigue and social relationships influenced physical activity in frail older community-dwellers during the Spanish lockdown due to the COVID-19 pandemic. *International journal of environmental research and public health*, *18*(2), 808.
7. Weaver, R. H., Jackson, A., Lanigan, J., Power, T. G., Anderson, A., Cox, A. E., ... & Weybright, E. (2021). Health behaviors at the onset of the COVID-19 pandemic. *American journal of health behavior*, *45*(1), 44-61.
8. Bethell, J., Aelick, K., Babineau, J., Bretzlaff, M., Edwards, C., Gibson, J. L., ... & McGilton, K. S. (2021). Social connection in long-term care homes: a scoping review of published research on the mental health impacts and potential strategies during COVID-19. *Journal of the American Medical Directors Association*, *22*(2), 228-237.
9. Phillips, W. J., & Hine, D. W. (2021). Self-compassion, physical health, and health behaviour: A meta-analysis. *Health Psychology Review*, *15*(1), 113-139.
10. Mckenzie, G., Willis, C., & Shields, N. (2021). Barriers and facilitators of physical activity participation for young people and adults with childhood-onset physical disability: a mixed

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methods systematic review. *Developmental Medicine & Child Neurology*, *63*(8), 914-924.
11. Shepherd, H. A., Evans, T., Gupta, S., McDonough, M. H., Doyle-Baker, P., Belton, K. L., ... & Black, A. M. (2021). The impact of COVID-19 on high school student-athlete experiences with physical activity, mental health, and social connection. *International Journal of Environmental Research and Public Health*, *18*(7), 3515.
12. Ruiz, M. C., Devonport, T. J., Chen-Wilson, C. H., Nicholls, W., Cagas, J. Y., Fernandez-Montalvo, J., ... & Robazza, C. (2021). A cross-cultural exploratory study of health behaviors and wellbeing during COVID-19. *Frontiers in psychology*, *11*, 608216.
13. Flanagan, E. W., Beyl, R. A., Fearnbach, S. N., Altazan, A. D., Martin, C. K., & Redman, L. M. (2021). The impact of COVID-19 stay-at-home orders on health behaviors in adults. *Obesity*, *29*(2), 438-445.
14. Zuo, Y., Ma, Y., Zhang, M., Wu, X., & Ren, Z. (2021). The impact of sharing physical activity experience on social network sites on residents' social connectedness: a cross-sectional survey during COVID-19 social quarantine. *Globalization and health*, *17*(1), 1-12.
15. Hall, G., Laddu, D. R., Phillips, S. A., Lavie, C. J., & Arena, R. (2021). A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another?. *Progress in cardiovascular diseases*, *64*, 108.
16. Harrison, E., Monroe-Lord, L., Carson, A. D., Jean-Baptiste, A. M., Phoenix, J., Jackson, P., ... & Richardson, M. L. (2021). COVID-19 pandemic-related changes in wellness behavior among older Americans. *BMC Public Health*, *21*(1), 1-11.
17. Teixeira, E., Fonseca, H., Diniz-Sousa, F., Veras, L., Boppre, G., Oliveira, J., ... & Marques-Aleixo, I. (2021). Wearable devices for physical activity and healthcare monitoring in elderly people: A critical review. *Geriatrics*, *6*(2), 38.
18. Yildirim, H., Işik, K., & Aylaz, R. (2021). The effect of anxiety levels of elderly people in quarantine on depression during covid-19 pandemic. *Social Work in Public Health*, *36*(2), 194-204.
19. Lippke, S., Fischer, M. A., & Ratz, T. (2021). Physical activity, loneliness, and meaning of friendship in young individuals–a mixed-methods investigation prior to and during the COVID-19 pandemic with three cross-sectional studies. *Frontiers in Psychology*, *12*, 617267.
20. Moore, K. A., & March, E. (2022). Socially Connected during COVID-19: Online social connections mediate the relationship between loneliness and positive coping strategies. *Journal of Stress, Trauma, Anxiety, and Resilience (J-STAR)*, *1*(1).
21. Holt-Lunstad, J. (2021). The major health implications of social connection. *Current Directions in Psychological Science*, *30*(3), 251-259.
22. Kasar, K. S., & Karaman, E. (2021). Life in lockdown: Social isolation, loneliness and quality of life in the elderly during the COVID-19 pandemic: A scoping review. *Geriatric Nursing*, *42*(5), 1222-1229.
23. Hung, L., Chow, B., Shadarevian, J., O'Neill, R., Berndt, A., Wallsworth, C., ... & Chaudhury, H. (2021). Using touchscreen tablets to support social connections and reduce responsive behaviours among people with dementia in care settings: A scoping review. *Dementia*, *20*(3), 1124-1143.
24. Naughton, F., Ward, E., Khondoker, M., Belderson, P., Marie Minihane, A., Dainty, J., ... & Notley, C. (2021). Health behaviour change during the UK COVID-19 lockdown: Findings from the first wave of the C-19 health behaviour and well-being daily tracker study. *British journal of health psychology*, *26*(2), 624-643.
25. Ntoumanis, N., Ng, J. Y., Prestwich, A., Quested, E., Hancox, J. E., Thøgersen-Ntoumani, C., ... & Williams, G. C. (2021). A meta-analysis of self-determination theory-informed intervention studies in the health domain: Effects on motivation, health

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behavior, physical, and psychological health. *Health psychology review*, *15*(2), 214-244.
26. Buda, G., Lukoševičiūtė, J., Šalčiūnaitė, L., & Šmigelskas, K. (2021). Possible effects of social media use on adolescent health behaviors and perceptions. *Psychological reports*, *124*(3), 1031-1048.
27. Fraser, T., & Aldrich, D. P. (2021). The dual effect of social ties on COVID-19 spread in Japan. *Scientific reports*, *11*(1), 1596.
Morina, N., Kip, A., Hoppen, T. H., Priebe, S., & Meyer, T. (2021). Potential impact

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