ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

ORIGINAL PAPER
ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

How important is exercising during COVID-19 lockdown?

ARCHIVES OF HELLENIC MEDICINE 2022, 39(4):536–540
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2022, 39(4):536–540

E. Bebetsos,
C. Konstantinidis,
D. Konstantoulas,
G. Bebetsos

School of Physical Education and Sport Science, Democritus University of Thrace, Komotini, Greece

OBJECTIVE **To investigate the contribution of the theory of planned behavior to prediction of the attitudes towards, and intention of adult involvement in exercise/physical activity during the COVID-19 pandemic.** METHOD **The study sample consisted of 904 individuals, 417 men and 487 women, aged 18–70 years. The participants completed the Greek version of the Planned Behavior Theory questionnaire.** RESULTS **The responses revealed differences in various domains concerning physical involvement between pre-COVID-19 and during COVID-19 periods, specifically in (a) attitudes, (b) intention, (c) attitude strength, (d) self-identity, and (e) subjective norms.** CONCLUSIONS **Physical activity is an area that can strengthen the psychological status of individuals. In contrast to the general trend in the COVID-19 era, our findings showed that people, even in the difficult situations representative of a pandemic crisis, tend to seek the best probable use of the possibilities available to them. One of these is exercise/physical activity, of which the study participants took full advantage during the lockdown period.**

Πόσο σημαντική είναι η άσκηση κατά τη διάρκεια του εγκλεισμού λόγω COVID-19;

Περίληψη στο τέλος του άρθρου

Key words

Attitude strength
Attitudes
Intention
Self-identity
Subjective norms

Submitted 2.9.2021
Accepted 21.9.2021

Since December 2019, the whole world has been facing a pandemic of coronavirus disease, known as SARS-CoV-2,[1] or COVID-19. One area that is affected by the new social circumstances of the pandemic is physical activity (PA).[2] The term PA includes any motion caused by the voluntary movement of the muscles of the body, resulting in the production of energy at a level above that produced at rest. This definition of PA includes engaging in a sport and occupation with regular exercise, but also occasional physical activities or hobbies.[3] PA is, therefore, a state with a wide range of applications, and is, in essence, one of the basic functions of an individual.[4]

Research over the last 15 years has shown that PA brings significant benefits to people with both physical and psychological diseases. PA can play an important role in reducing the incidence of mental illnesses, such as depression and suicide, and be a shield against stress.[5] Participation in PA can be considered a "type of behavior" that can be investigated, and the factors that determine it can be explored. One theory that can provide explanations of this behavior is the "theory of planned behavior",[6] according to which, immediately preceding any behavior is the "intention" of the individual to act.

The execution of specific behavior is not related solely to the intention of the individual;[7] a behavior can be completely controlled by the individual, in other words, it depends on him(her) whether he(she) decides to execute it or not. Regardless of the person's intention to perform a behavior, there are usually obstacles that can hamper the execution, which may be internal factors, such as skills, abilities, knowledge, planning, and external factors such as time, opportunities, information, etc.[8]

Related research[9,10] has examined extra factors with regard to behavioral prediction that may influence a person's intention, specifically, "attitude strength" and "self-identity". Attitude strength refers to the confidence that the person feels about the specific behavior, how correct he(she) perceives the view is to act in this way, the importance he(she) feels in terms of the intention, and whether knowledge, information, and interest play an important role in shaping

the intention. Self-identity focuses on how capable each person feels that he(she) is to follow the new behavior; it affects the intention of the individual, but is, in turn, affected by the strength of his(her) attitudes.

The benefits of exercise are widely documented.[3–5] At this crucial period, with COVID-19 an intense part of human experience and with recognition of the importance of PA to human health and well-being, the question of whether people's PA behavior is affected by COVID-19 and lockdown is an important research issue. To date, research is showing that people have changed their behavior regarding PA during the COVID-19 lockdown, with most decreasing their engagement in PA, but some of them increasing it.[10–18]

In view of the relative absence of research on PA in the time of pandemic in Greece and internationally, this study aimed to record the attitudes and intentions of adults regarding their involvement in PA during the period of the traffic circulation ban because of COVID-19 in Greece. Although the involvement of individuals in PA has been the focus of previous research, the uniqueness of this study is its combination with the extremely critical circumstances of the pandemic.

MATERIAL AND METHOD

The sample consisted of 904 individuals, 417 men (46.2%), and 487 women (53.8%), between the ages of 18 and 70 years (mean 36.26±12.48 years). The participants completed anonymously the Greek version[8] of an open-ended questionnaire based on the "Theory of Planned Behavior" questionnaire.[7] The questionnaire includes the items of "attitudes", "intention", "subjective norms", "role identity", "attitude strength", "knowledge", and "information".

The participants also indicated if they exercised before and during the pandemic lockdown, by providing a "yes" or "no" answer (tab. 1), and they indicated their weekly PA/exercise involvement, if any (tab. 2).

RESULTS

Univariate analysis was conducted to explore differences among the PA/exercise level according to their responses to the various items on the questionnaire. The following statistically significant differences were detected: (a) For attitudes: ($F_{2,841}$=9.01; p<0.05), (b) for intention: ($F_{2,841}$=8.721, p<0.05), (c) for self-identity: ($F_{2,841}$=9.82; p<0.05), (d) for attitude strength ($F_{2,841}$=5.483, p<0.05), and for subjective norms ($F_{2,841}$=3.759, p<0.05). *Post hoc* multiple comparison Scheffe tests indicated differences between the involvement in PA of individuals before and during the pandemic lockdown (tab. 3).

Table 1. Involvement in physical activity before and during the COVID-19 lockdown (n=904).

	Before COVID-19 lockdown	During COVID-19 lockdown
No	361 (40%)	181 (20%)
Yes	543 (60%)	723 (80%)

Table 2. Weekly involvement in physical activity (PA) before and during the COVID-19 lockdown (n=904).

Times per week	PA before lockdown	PA during lockdown
	n	n
0	361	181
1	26	17
2	114	73
3	173	126
4	180	136
5	50	200
6		107
7		64

DISCUSSION

This study investigated whether the responses on the Theory of Planned Behavior questionnaire can predict possible differences in PA behavior during the COVID-19 lockdown. An attempt was made to ascertain whether there was a change in participation in PA before and during the COVID-19 lockdown, and to find out which factors affect the behavioral change. Contrary to the global trend towards a decrease in PA habits, documented in China,[19] the United States (US),[20] Europe,[2,10] and Canada,[22] the findings of this study revealed an increase in involvement in PA

Table 3. Univariate analysis of factors on the Planned Behavior Theory questionnaire (n=904).

Factors	Before lockdown		During lockdown	
	M	SD	M	SD
Attitudes	4.67	1.42	*6.21*	*0.708*
Intention	4.51	1.33	*5.42*	*1.34*
Attitude strength	4.43	1.55	*5.08*	*1.09*
Self-identity	4.89	1.72	*6.16*	*1.02*
Subjective norms	3.01	1.61	*4.62*	*1.10*

M: Mean, SD: Standard deviation

during the lockdown compared with before the lockdown. The recorded difference is even more interesting when comparing the people who changed behavior. As other studies showed[2] some people with strong before-lockdown PA habits reduced PA during lockdown.

Regarding the recorded increase in participation in PA during COVID-19 lockdown, it has been shown that a change in context can disrupt behaviors.[23–25] The authors assume that the recorded increase in PA happened because of the increase in free time. Lockdown changes people's routine at all levels, and the changes that it brought to their daily obligations also affected their "diversion" activities. The study sample was mostly urban and highly educated. According to the theory,[26] there is disconnection of work from PA for people of high educational level, who when they leave their jobs feel that they must use more free time for PA.[27] During the COVID-19 lockdown, therefore, considering that there was work suspension for most people, the change of attitude towards PA can be fully justified, and explains the increase.

This can also explain the rise in weekly involvement in PA. Before lockdown, the participants declared 5 times per week, at most, engagement in PA. During the COVID-19 lockdown, some persons exercised even 7 times during the week. This finding is in agreement with previous research, which found a significant association between pre-lockdown and during lockdown PA behavior.[22] The availability of home PA equipment contributed substantially to maintaining and increasing engagement in PA during the COVID-19 lockdown. Our study took place in Greece, where the increase in sales of sports equipment during lockdown was 625.6%.[28]

In addition, the proportion of people who did not exercise at all was reduced to half. Although opportunities for relaxation act as temptations and distract people from their intention to be physically active,[13] there is still a general possibility that traffic ban and closure of all the places that used to contribute to their sedentary habit (e.g., bars and tavernas) acted as a springboard for the development of more sporting activities. In addition to the logistical infrastructure, one factor that affects the attitude of individuals is the identity of the individual. This was confirmed both in the present study and in the international literature.[29–32] PA identity shows a positive correlation with self-regulation,[32] and our study findings are fully in line with this theoretical model.

It is proven that planning is a good strategy in PA, and is a hallmark construct of action control theories.[34] The hypothesis that those who stay focused on their home exercise routines would be likely to remain unaffected by the COVID-19 restrictions[22] is also confirmed in our study. The analysis showed that intention is a factor leading to significant differences in peoples' engagement in PA. The authors, therefore, recommend the development of strategies targeted at increasing the intention of individuals, in order to increase participation in PA.

A factor that influenced the behavior of the study participants is related to social norms. Socio-economic factors are mentioned in other studies,[19,22] but in the areas where they were conducted, the isolation of individuals may have played an important negative role. In Greece, there is a strong bond with people's families and their social environment, which was captured in our study, and subjective norms made a difference, reflected in the reported changes in PA.

In summary, PA can be considered as a part of the positive management of free time during a pandemic lockdown. Possible limitations of the study should be noted, such as the psychological state of individuals in such difficult and unprecedented circumstances. Follow-up investigations, therefore, could focus on exploring PA attitudes and behaviors in the upcoming months, after removal of the restrictions.

ΠΕΡΙΛΗΨΗ

Πόσο σημαντική είναι η άσκηση κατά τη διάρκεια του εγκλεισμού λόγω COVID-19;

Ε. ΜΠΕΜΠΕΤΣΟΣ, Χ. ΚΩΝΣΤΑΝΤΙΝΙΔΗΣ, Δ. ΚΩΝΣΤΑΝΤΟΥΛΑΣ, Γ. ΜΠΕΜΠΕΤΣΟΣ

Σχολή Επιστήμης Φυσικής Αγωγής και Αθλητισμού, Δημοκρίτειο Πανεπιστήμιο Θράκης, Κομοτηνή

Αρχεία Ελληνικής Ιατρικής 2022, 39(4):536–540

ΣΚΟΠΟΣ Η διερεύνηση της συμβολής της θεωρίας της σχεδιασμένης συμπεριφοράς στην πρόβλεψη στάσεων και πρόθεσης εμπλοκής ενηλίκων με άσκηση/φυσική δραστηριότητα κατά τη διάρκεια της πανδημίας. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Το δείγμα αποτέλεσαν 904 άτομα, 417 άνδρες και 487 γυναίκες, ηλικίας 18–70 ετών. Οι συμμετέχοντες συμπλή-

ρωσαν την ελληνική έκδοση του ερωτηματολογίου της «θεωρίας της σχεδιασμένης συμπεριφοράς». **ΑΠΟΤΕΛΕΣΜΑΤΑ** Οι αναλύσεις εμφάνισαν στατιστικά σημαντικές διαφορές στους παράγοντες: (α) Στάσεις, (β) πρόθεση, (γ) δύναμη στάσεων, (δ) αυτοταυτότητα, και (ε) κοινωνικά πρότυπα. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η άσκηση/φυσική δραστηριότητα είναι ένας τομέας που μπορεί να ενισχύσει την ψυχολογική κατάσταση των ατόμων. Σε αντίθεση με τη γενική τάση της εποχής της COVID-19, τα ευρήματά μας έδειξαν ότι οι άνθρωποι ακόμη και σε δύσκολες καταστάσεις, που είναι αντιπροσωπευτικές μιας πανδημικής κρίσης, τείνουν να αναζητούν την καλύτερη δυνατή χρήση των δυνατοτήτων που έχουν στη διάθεσή τους. Μία από αυτές είναι η άσκηση/σωματική δραστηριότητα, την οποία το δείγμα εκμεταλλεύτηκε πλήρως κατά την περίοδο της καραντίνας.

Λέξεις ευρετηρίου: Αυτοταυτότητα, Δύναμη στάσεων, Κοινωνικά πρότυπα, Πρόθεση, Στάσεις

References

1. LEE A. Wuhan novel coronavirus (COVID-19): Why global control is challenging? *Public Health* 2020, 179:A1–A2
2. MALTAGLIATI S, REBAR A, FESSLER L, FORESTIER C, SARRAZIN P, CHALABAEV A ET AL. Evolution of physical activity habits after a context change: The case of COVID-19 lockdown. *Br J Health Psychol* 2021, 10.1111/bjhp.12524
3. BOUCHARD C, BLAIR SN, HASKELL WL. *Physical activity and health*. 2nd ed. Human Kinetics, Champaign, Il, 2012
4. CAVILL N, KAHLMEIER S, RACIOPPI F. *Physical activity and health in Europe: Evidence for action*. WHO, Copenhagen, 2006
5. BIDDLE S, MUTRIE N. *Psychology of physical activity: Determinants, well-being, and interventions.* Routledge, New York, 2008
6. VAN LANGE PAM, KRUGLANSKI AW, HIGGINS ET. *Handbook of theories of social psychology.* Sage, Los Angeles, 2012
7. AJZEN I, MADDEN TJ. Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *J Exp Soc Psychol* 1986, 22:453–474
8. THEODORAKIS Y. Planned behavior, attitude strength, role identity, and the prediction of exercise behavior. *Sport Psychol* 1994, 8:149–165
9. THEODORAKIS Y, DOGANIS G, BAGIATIS K, GOUTHAS M. Preliminary study of the ability of reasoned action model in predicting exercise behavior of young children. *Percept Motor Skills* 1991, 72:51–58
10. CHEVAL B, SIVARAMAKRISHNAN H, MALTAGLIATI S, FESSLER L, FORESTIER C, SARRAZIN P ET AL. Relationships between changes in self-reported physical activity, sedentary behaviour and health during the coronavirus (COVID-19) pandemic in France and Switzerland. *J Sports Sci* 2021, 39:699–704
11. CONSTANDT B, THIBAUT E, DE BOSSCHER V, SCHEERDER J, RICOUR M, WILLEM A. Exercising in times of lockdown: An analysis of the impact of COVID-19 on levels and patterns of exercise among adults in Belgium. *Int J Environ Res Public Health* 2020, 17:4144
12. DESCHASAUX-TANGUY M, DRUESNE-PECOLLO N, ESSEDDIK Y, DE EDELENYI FS, ALLÈS B, ANDREEVA VA ET AL. Diet and physical activity during the COVID-19 lockdown period (March–May 2020): Results from the French NutriNet-Sante cohort study. *medRxiv* 2020. Available at: https://doi.org/10.1101/2020.06.04.20121855
13. GALLÈ F, SABELLA EA, FERRACUTI S, DE GIGLIO O, CAGGIANO G, PROTANO C ET AL. Sedentary behaviors and physical activity of Italian undergraduate students during lockdown at the time of CoViD-19 pandemic. *Int J Environ Res Public Health* 2020, 17:617
14. SAÑUDO B, FENNELL C, SÁNCHEZ-OLIVER AJ. Objectively-assessed physical activity, sedentary behavior, smartphone use, and sleep patterns pre-and during-COVID-19 quarantine in young adults from Spain. *Sustainability* 2020, 12:5890
15. GOETHALS L, BARTH N, GUYOT J, HUPIN D, CELARIER T, BONGUE B. Impact of home quarantine on physical activity among older adults living at home during the COVID-19 pandemic: Qualitative interview study. *JMIR Aging* 2020, 3:e19007
16. FRÜHAUF A, SCHNITZER M, SCHOBERSBERGER W, WEISS G, KOPP M. Jogging, Nordic walking and going for a walk – interdisciplinary recommendations to keep people physically active in times of the COVID-19 lockdown in Tyrol, Austria. *Current Issues in Sport Science* 2020, 4:100
17. RICE WL, MEYER CM, LAWHON B, TAFF BD, MATEER T, REIGNER N ET AL. The COVID-19 pandemic is changing the way people recreate outdoors: Preliminary report on a national survey of outdoor enthusiasts amid the COVID-19 pandemic. *SocArXiv* 2020, 18:1–15. Available at: https://doi.org/10.31235/osf.io/prnz9
18. SCHNITZER M, SCHÖTTL SE, KOPP M, BARTH M. COVID-19 stay-at-home order in Tyrol, Austria: Sports and exercise behaviour in change? *Public Health* 2020, 185:218–220
19. QIN F, SONG Y, NASSIS GP, ZHAO L, DONG Y, ZHAO C ET AL. Prevalence of insufficient physical activity, sedentary screen time and emotional well-being during the early days of the 2019 novel Coronavirus (COVID-19) outbreak in China: A national cross-sectional study. *Int J Environ Res Public Health* 2020, 17:5170
20. DUNTON GF, WANG SD, DO B, COURTNEY J. Early effects of the COVID-19 pandemic on physical activity locations and behaviors in adults living in the United States. *Prev Med Rep* 2020, 20:101241
21. MEYER JF, McDOWELL C, LANSING J, BROWER C, SMITH L, TULLY M ET AL. Changes in physical activity and sedentary behaviour due to the COVID-19 outbreak and associations with mental health in 3,052 US adults. *Int J Environ Res Public Health* 2020, 17:6949
22. RHODES RE, BOUDREAU P. *Physical activity and personality traits.* Oxford Research Encyclopedia of Psychology, 2017. Available at: https://doi:10.1093/acrefore/9780190236557.013.210
23. WOOD W, TAM L, WITT MG. Changing circumstances, disrupting habits. *J Per Soc Psychol* 2005, 88:918–933
24. VERPLANKEN B, WOOD W. Interventions to break and create con-

sumer habits. *J Public Policy Mark* 2006, 25:90–103
25. FREDSLUND EK, LEPPIN A. Can the Easter break induce a long-term break of exercise routines? An analysis of Danish gym data using a regression discontinuity design. *BMJ Open* 2019, 9:e024043
26. SHAW BA, SPOKANE LS. Examining the association between education level and physical activity changes during early old age. *J Aging Health* 2008, 20:767–787
27. BEBETSOS E, KONSTANTINIDIS C. Does education level differentiate adults' attitudes towards physical activity during COVID-19 pandemic? A preliminary study. Aquademia 2021, 5:ep21009. Available at: https://doi.org/10.21601/aquademia/10965iefimerida. E-shops: Τι αγοράζουν οι Έλληνες στην καραντίνα – αυτό το προϊόν έχει αύξηση στη ζήτηση 2.675% (και δεν είναι αντισηπτικά). iefimerida, 2020. Διαθέσιμο στο: https://www.iefimerida.gr/ellada/agores-koronoioy-proionta-ektoxeysan-poliseis
28. KWASNICKA D, DOMBROWSKI SU, WHITE M, SNIEHOTTA F. Theoretical explanations for maintenance of behaviour change: A systematic review of behaviour theories. *Health Psychol Rev* 2016, 10:277–296
29. RHODES RE, LIU S, LITHOPOULOS A, ZHANG CQ, GARCIA-BARRERA MA. Correlates of perceived physical activity transitions during the COVID-19 pandemic among Canadian adults. *App Psychol Health Well Being* 2020, 12:1157–1182. Available at: https://doi.org/10.1111/aphw.12236
30. SOTO CJ. How replicable are links between personality traits and consequential life outcomes? The life outcomes of personality replication project. *Psychol Sci* 2019, 30:711–727
31. RHODES RE, JANSSEN I, BREDIN SSD, WARBURTON DER, BAUMAN A. Physical activity: Health impact, prevalence, correlates and interventions. *Psychol Health* 2017, 32:942–975
32. STRACHAN SM, PERRAS MGM, FORNERIS T, STADIG GS. I'm an exerciser: Common conceptualisations of and variation in exercise identity meanings. *Int J Sport Exer Psychol* 2017, 15:321–336
33. RHODES RE, YAO CA. Models accounting for intention-behavior discordance in the physical activity domain: A user's guide, content overview, and review of current evidence. *Int J Behav Nutr Phys Act* 2015, 12:9

Corresponding author:

E. Bebetsos, School of Physical Education & Sport Science, Democritus University of Thrace, 691 00 Komotini, Greece
e-mail: empempet@phyed.duth.gr