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## Short Communication

## The role of personality traits in leisure time physical activity during COVID-19 pandemic

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## ABSTRACT

The COVID-19 pandemic has affected everyday life, including physical activity behavior. This study examined the role of the five factor model of personality traits on leisure time physical activity during the pandemic in a sample ( $n = 168$ ) of 61 year-old Finnish men and women, participating in a larger longitudinal study, between April 2020 and April 2021. Frequency of participation and changes in leisure time physical activity were self-reported. Personality traits and facets were assessed with the 181-item NEO-PI. Openness was the only factor positively associated with leisure time physical activity frequency. Participants scoring higher in extraversion (particularly the activity-facet) and lower in openness to values were more likely to report change in their physical activity. In conclusion, individual differences in traits appear to have played a role in physical activity behavior during the pandemic.

## 1. Introduction

Personality traits reflect relative stable individual patterns in thinking, feeling and behaving (McAdams, 1995), and hence may explain why some people adapt more easily to stressful situations like a pandemic. The global COVID-19 pandemic has affected many areas of everyday life, including physical activity (PA) behavior (Castañeda-Babarro, Arbillaga-Etxarri, Gutiérrez-Santamaría, & Coca, 2020; Rhodes, Liu, Lithopoulos, Zhang, & Garcia-Barrera, 2020).

Of the five-factor model personality traits, higher extraversion, conscientiousness and openness, and lower neuroticism are generally associated with higher PA (Wilson & Dishman, 2015). Each trait is represented by facets; for example, an individual scoring average on openness may score high in openness to values and low in openness to actions. These narrower personality facets may be even better predictors of specific behaviors than traits (Paunonen & Ashton, 2001). For example, the positive association between extraversion and PA seems to be explained by the facet of activity (Rhodes, Courneya, & Jones, 2004).

Personality traits seem to explain behaviors even in highly controlled situations, such as the COVID-19 pandemic (Götz, Gvirtz, Galinsky, & Jachimowicz, 2021). The associations between personality, i.e., high extraversion, conscientiousness, openness, and low neuroticism, and PA found in pre-pandemic studies, resemble those found during the

pandemic (Stephan et al., 2020). Rhodes et al. (2020) reported similar results for neuroticism, the activity facet of extraversion, and the goal-striving facet of conscientiousness. Moreover, high extraversion (Okely et al., 2021), the activity facet of extraversion (Rhodes et al., 2020), conscientiousness, agreeableness and low neuroticism (Stephan et al., 2020) have all been associated with positive change in PA during the pandemic.

This exploratory study investigated the role of personality traits and their facets in leisure time PA behavior among 61-year-old Finnish adults during COVID-19. Based on prior research, we hypothesized that the same traits associated with PA in general, (i.e., lower neuroticism, higher extraversion (particularly the activity facet), higher conscientiousness and openness) are associated with the higher frequency of PA and increase in it during the pandemic.

## 2. Methods

## 2.1. Participants

Participants were drawn from the ongoing Jyväskylä Longitudinal Study of Personality and Social Development (JYLS) (Pulkkinen, 2017). The same participants, representing the Finnish age cohort born in 1959, have been followed since age 8 (initial  $n = 369$ ).

Abbreviations: PA, Physical Activity.

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The latest data collection, at age 61, was approved by the Ethical Committee of the University of Jyväskylä, Finland and started in February 2020, when a letter of invitation and the Life Situation Questionnaire was mailed to the 301 surviving participants who had not withdrawn from the study. The face-to-face psychological interviews and accompanying questionnaires started on March 4th and were suspended on March 16th when the University was locked down after the Finnish Government declared a state of emergency in Finland. The interviews, including postal questionnaires (e.g., personality tests), were resumed online on April 6th and face-to-face on June 13th. The data collection remains ongoing. The present study utilizes cross-sectional data ( $n = 168$ ) collected during April 2020 through April 2021. All participants gave their informed consent. Due to data sensitivity, the data cannot be openly shared. The longitudinal data are and the data from ongoing data collection will be stored in the Finnish Social Science Data Archive (<https://www.fsd.uta.fi/en/>).

## 2.2. Measures

**Personality traits** of neuroticism, extraversion, openness, conscientiousness and agreeableness were measured with an authorized adaption of the 181-item NEO Personality Inventory (Costa & McCrae, 1985; Pulver, Allik, Pulkkinen, & Hämäläinen, 1995), mailed to the participants. Neuroticism, extraversion, and openness were divided into six facets each containing eight items. The facets were anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability for neuroticism; warmth, gregariousness, assertiveness, excitement seeking and positive emotions for extraversion; and fantasy, aesthetics, feelings, actions, ideas, and values for openness. Conscientiousness and agreeableness were each measured by 18 items. Cronbach's alphas were 0.92 for neuroticism, 0.90 for extraversion, 0.81 for conscientiousness, 0.91 for openness and 0.76 for agreeableness. Missing personality information ( $n = 13$ ) for five traits was imputed if the information was available from previous data collection phases ( $n = 10$ ).

**Leisure time PA during COVID-19** was elicited with the question: "How often do you engage in PA in your leisure time during the present COVID-19 emergency?". The response scale was from never (=1) to practically every day (=7). For further analysis, the categories from never (=1) to once a week (=4) were merged.

**Change in leisure time PA during COVID-19** was assessed with the question "Have you changed your PA or exercise behavior during the COVID-19 pandemic?". The response options were No (=1); Yes, increased a lot (=2); Yes, increased a little (=3); Yes, reduced a little (=4); and Yes, reduced a lot (=5). For further analysis, participants were recoded into three groups: 1 = No change (1), 2 = Increased (2,3); and 3 = Decreased (4, 5).

## 2.3. Statistical analysis

Statistical analyses were performed using SPSS version 26. Associations between the study variables were first analyzed by Chi-square test and one-way ANOVA. The role of personality in PA frequency during COVID-19 was analyzed with ordinal regression analysis and in PA change with multinomial regression analysis. The assumption of proportional odds was confirmed by non-significant tests of parallel lines for ordinal regression. Personality traits and their facets were standardized before the analysis. Models were adjusted by gender. For both outcomes, four models were estimated. The first model contained the five personality traits and gender. The rest models included the six facets of neuroticism, extraversion or openness, and gender.

## 3. Results

### 3.1. Representativeness of the sample

The previous JYLS data collection was implemented in 2009 when

**Table 1**  
Sample characteristics ( $n = 168$ ).

	%	N
Gender		
Men	46	77
Women	54	91
Physical activity		
1 time/wk or less	20	34
2–3 times/wk	30	50
4–5 times/wk	17	28
Daily	33	56
Change in physical activity		
No change	45	76
Increased	17	28
Decreased	38	64
	Mean ( $n = 165$ )	SD
Neuroticism	2.30	0.47
Extraversion	3.14	0.43
Openness	3.35	0.44
Conscientiousness	3.69	0.46
Agreeableness	3.85	0.39

**Table 2**

Associations between personality traits and frequency of leisure time PA during COVID-19: ordinal regression analysis ( $n = 165$ ).

	OR	95% CI	p
Neuroticism	1.27	0.86–1.87	0.228
Extraversion	1.16	0.77–1.74	0.474
Openness	1.61	1.06–2.45	0.025
Conscientiousness	1.17	0.84–1.63	0.347
Agreeableness	1.01	0.71–1.44	0.955
Gender <sup>a</sup>	1.88	0.96–3.70	0.068

<sup>a</sup> Reference group = men.

the participants were age 50. The sample was representative of the Finnish age cohort born in 1959 (Pulkkinen, 2017). Comparison of the present and age 50 samples showed no difference in leisure time PA. However, the present sample scored higher on openness, and agreeableness, and lower on neuroticism at age 50. Additionally, women, married participants and participants with higher education were overrepresented in the present sample (Supplementary Table 1).

### 3.2. Descriptive statistics

The final sample for the present study comprised the 168 participants who replied to the COVID-19-related PA questions. Sample characteristics are presented in Table 1.

Gender was related to both PA outcomes: women were more likely than men to report exercising daily ( $\chi^2 = 8.57$ ,  $df = 3$ ,  $p = .036$ ) and both increasing and decreasing their PA during the pandemic ( $\chi^2 = 15.27$ ,  $df = 2$ ,  $p \leq 0.001$ ).

### 3.3. Frequency of leisure time PA during pandemic

The results of the ordinal regression analyses for the five personality traits are presented in Table 2. Of the traits, only openness was positively associated with frequency of PA. None of the facets was associated with the outcome (Supplementary Table 2).

### 3.4. Change in PA during pandemic

The results of the multinomial regression analyses with the five personality traits are presented in Table 3. Extraversion and gender were associated with PA change: participants scoring higher in extraversion and women were more likely to be in the Increased or Decreased than No

**Table 3**

Associations of personality traits with self-reported change in physical activity during COVID-19: multinomial regression analysis (n = 165).

	Increased vs. no change			Decreased vs. no change			Increased vs. decreased		
	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p
Neuroticism	1.70	0.93–3.12	0.086	1.47	0.92–2.35	0.112	1.16	0.66–2.05	0.612
Extraversion	2.53	1.30–4.95	0.007	2.20	1.33–3.67	0.002	1.15	0.61–2.18	0.671
Openness	0.84	0.45–1.58	0.595	0.64	0.39–1.04	0.071	1.32	0.72–2.42	0.368
Conscientiousness	1.52	0.89–2.59	0.123	1.27	0.85–1.90	0.248	1.20	0.72–1.20	0.486
Agreeableness	0.99	0.55–1.79	0.978	1.06	0.69–1.63	0.801	0.94	0.53–1.67	0.828
Gender <sup>a</sup>	6.46	2.03–20.50	0.002	4.61	1.97–10.82	<0.001	1.40	0.45–4.36	0.561

<sup>a</sup> Reference group = men.

change group.

The facet-level analyses showed that the Increased and Decreased groups scored higher on Activity (the facet of extraversion) and lower on Values (the facet of openness) than the No Change group (Supplementary Table 3).

#### 4. Discussion

This study investigated the role of personality traits and their facets on PA among Finnish 61-year-old adults during COVID-19. Higher openness was associated with more frequent PA. Extraversion, namely the activity facet, and openness to values were related to PA change.

Contrary to previous studies showing associations of lower neuroticism, higher extraversion, and higher conscientiousness with PA in general (Wilson & Dishman, 2015) and during the pandemic (Rhodes et al., 2020; Stephan et al., 2020), only openness was positively associated with PA in this study. Openness has been associated with rambling in nature (Karvonen, Törmäkangas, Pulkkinen, & Kokko, 2020) and various physical activities (Lipowski, Lipowska, Peplinska, & Jezewska, 2014). Participants scoring higher on openness may have been more interested in findings alternative ways to be physically active despite the COVID-19 restrictions.

Surprisingly, those reporting increased and decreased PA did not differ from each other in personality traits. Instead, all differences were between participants whose PA remained unchanged and those whose activity either increased or decreased. The activity facet of extraversion is related to fast-paced living (Costa & McCrae, 1985). In line with previous findings (Rhodes et al., 2020), it explained the associations between extraversion and change in PA. It is possible that due to restrictions imposed during the pandemic, high scorers on the activity facet either decreased their PA owing to canceled activities (e.g., group fitness, social activities including incidental exercise) or replaced canceled activities with alternative physical activities.

The No change group scored higher on openness to values than the Increased and Decreased groups. High scores in openness to values indicate open-mindedness to others' viewpoints and low authority honoring (Costa & McCrae, 1985). It could be speculated that people scoring low in this facet are more likely to comply with the pandemic restrictions which leads to changes in PA. The same may be the case for women who are more likely to comply with public policy measures than men (Galasso et al., 2020).

The limitations of this study include the cross-sectional analysis and self-reports of PA and changes in it. Moreover, PA behavior during a pandemic may be influenced by various potential cofounders, not controlled for here. A strength of this study is its population-based representative, if partially selected in the present analyses, sample of men and women born in 1959. While previous pandemic-related studies have only used online questionnaires, restarting the face-to-face interviews enabled data to be obtained from participants unwilling to participate online.

#### 5. Conclusions

This study illuminates the individual characteristics that may predict leisure time PA behavior and changes in it during crisis situations like the pandemic. People with lower openness may be at higher risk for inactivity when their usual PA is restricted. In addition, people with the same personality characteristics, e.g., high scores in the activity facet, may react differently, either by decreasing their PA or taking it as an opportunity to increase their PA. Public health messages during crisis situations should recommend alternative and personality-fitting ways of being physically active and utilize the abnormal situation to develop novel PA-related practices and routines.

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#### CRedit authorship contribution statement

**Tiia Kekäläinen:** Conceptualization, Formal analysis, Investigation, Writing – original draft. **Sarianna Sipilä:** Resources, Writing – review & editing. **Milla Saajanaho:** Investigation, Writing – review & editing, Project administration. **Katja Kokko:** Investigation, Writing – review & editing, Supervision, Project administration, Funding acquisition.

#### Declaration of competing interest

None.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2021.111080>.

#### References

- Castañeda-Babarro, A., Arbillaga-Etxarri, A., Gutiérrez-Santamaría, B., & Coca, A. (2020). Physical activity change during COVID-19 confinement. *International Journal of Environmental Research and Public Health*, 17(18), 6878. <https://doi.org/10.3390/ijerph17186878>.
- Costa, P. T., & McCrae, R. R. (1985). *The NEO personality inventory manual*. Psychological Assessment Resources.
- Galasso, V., Pons, V., Profeta, P., Becher, M., Brouard, S., & Foucault, M. (2020). Gender differences in COVID-19 related attitudes and behavior. In *No. w27359. Evidence from a panel survey in eight OECD countries*. National Bureau of Economic Research. <https://doi.org/10.3386/w27359>.
- Götz, F. M., Gvirtz, A., Galinsky, A. D., & Jachimowicz, J. M. (2021). How personality and policy predict pandemic behavior: Understanding sheltering-in-place in 55 countries at the onset of COVID-19. *American Psychologist*, 76(1), 39–49. <https://doi.org/10.1037/amp0000740>.
- Karvonen, J., Törmäkangas, T., Pulkkinen, L., & Kokko, K. (2020). Associations of temperament and personality traits with frequency of physical activity in adulthood. *Journal of Research in Personality*, 84, Article 103887. <https://doi.org/10.1016/j.jrp.2019.103887>.

- Lipowski, M., Lipowska, M., Peplinska, A., & Jezewska, M. (2014). Personality determinants of health behaviours of merchant navy officers. *International Maritime Health*, 65(3), 158–165. <https://doi.org/10.5603/IMH.2014.0030>.
- McAdams, D. P. (1995). What do we know when we know a person? *Journal of Personality*, 63(2), 365–396.
- Okely, J. A., Corley, J., Welstead, M., Taylor, A. M., Page, D., Skarabela, B., ... Russ, T. C. (2021). Change in physical activity, sleep quality, and psychosocial variables during COVID-19 lockdown: Evidence from the Lothian Birth Cohort 1936. *International Journal of Environmental Research and Public Health*, 18(1), 210. <https://doi.org/10.3390/ijerph18010210>.
- Paunonen, S. V., & Ashton, M. C. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology*, 81(3), 524–539. <https://doi.org/10.1037/0022-3514.81.3.524>.
- Pulkkinen, L. (2017). *Human development from middle childhood to middle adulthood: Growing up to the middle-aged (in collaboration with Katja Kokko)*. Routledge.
- Pulver, A., Allik, J., Pulkkinen, L., & Hämmäläinen, M. (1995). A Big Five personality inventory in two non-Indo-European languages. *European Journal of Personality*, 9(2), 109–124. <https://doi.org/10.1002/per.2410090205>.
- Rhodes, R. E., Courneya, K. S., & Jones, L. W. (2004). Personality and social cognitive influences on exercise behavior: Adding the activity trait to the theory of planned behavior. *Psychology of Sport and Exercise*, 5(3), 243–254. [https://doi.org/10.1016/S1469-0292\(03\)00004-9](https://doi.org/10.1016/S1469-0292(03)00004-9).
- Rhodes, R. E., Liu, S., Lithopoulos, A., Zhang, C.-Q., & Garcia-Barrera, M. A. (2020). Correlates of perceived physical activity transitions during the COVID-19 pandemic among Canadian adults. *Applied Psychology: Health and Well-Being*, 12(4), 1157–1182. <https://doi.org/10.1111/aphw.12236>.
- Stephan, Y., Terracciano, A., Luchetti, M., Aschwanden, D., Lee, J. H., Sesker, A. A., ... Sutin, A. R. (2020). Physical activity and sedentary behavior during COVID-19: Trajectory and moderation by personality. *Social Psychological and Personality Science*, Article 1948550620962945. <https://doi.org/10.1177/1948550620962945>.
- Wilson, K. E., & Dishman, R. K. (2015). Personality and physical activity: A systematic review and meta-analysis. *Personality and Individual Differences*, 72, 230–242. <https://doi.org/10.1016/j.paid.2014.08.023>.