

**Self-reported physical activity and fitness, mental health, and well-being among asylum seekers
in a refugee camp in Greece.**

Konstantinia Filippou, Florian Knappe, Antonis Hatzigeorgiadis, Ioannis D. Morres, Emmanouil Tzormpatzakis¹, Elsa Havas, Yannis Theodorakis, Uwe Pühse, Gerber Markus

Abstract

Global forced displacement has been rising steeply since 2015 as a result of wars, and human rights abuses. Forcibly displaced people are often exposed to physical and mental strain, which causes traumatic experiences and poor mental health. Physical activity has been linked with better mental health, though such evidence is scarce for refugees. The purpose of the study was to examine the relationships of self-reported physical activity and fitness with mental health indices among asylum seekers. Participants were 151 individuals (76 women, 75 men; mean age 28.90 years) displaced from their homes for an average of 32.03 months. Among them, 67% were from Afghanistan and the Middle East and 33% from sub-Saharan countries. Participants completed self-report measures assessing physical activity, post-traumatic stress disorder (PTSD), depression, anxiety, and well-being. High prevalence of mental health disorders and poor well-being were identified, with women, Asians, and people with families in the camp showing poorer mental health. PTSD, depression, and anxiety were related to perceived fitness but not self-reported physical activity. Regression analysis showed that perceived fitness and low intensity could significantly predict well-being. The findings provide useful evidence regarding the link between well-being and physical activity; nevertheless, further research examining objectively measured physical activity is warranted to complement this data and further explore the associations between physical activity and mental health.

Keywords: post-traumatic stress disorder, depression, generalized anxiety disorder, refugees, forcibly displaced people, exercise.

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A historic rise in forced displacement was recorded in the year 2022. These numbers have been rising sharply since 2015 due to persecution, conflict, violence, human rights violations, or events seriously disturbing public order (UNHCR, 2022). Most recently, the conflict between Russia and Ukraine, which has been recorded as one of the fastest and largest forced displacement emergencies since World War II, has resulted in global forced displacement reaching the dramatic number of 100 million people; double the number of people who were forcibly displaced ten years ago. Due to its geographical position, Greece is one of the major entrance gate points to Europe for many forcibly displaced people coming mostly from Asia and Africa, through sea and mainland, and thus a constant place for asylum-seeking for over a decade. Between 2020 and 2022, thousands of asylum seekers were stranded in Greece, as a result of the extended asylum procedures, lasting, in cases, over a year. According to statistics in September 2022, there were 147,420 refugees and 22,117 asylum seekers in Greece, mostly coming from Syria, Afghanistan, and Ukraine (UNHCR, 2022b). These people struggle to overcome physical and mental difficulties as they await decisions regarding resettlement, repatriation/deportation, or asylum. The general health condition and quality of life of asylum seekers are negatively impacted by the protracted asylum process (Laban et al., 2008).

It has been argued that migrants are generally healthier than host populations when arriving in the host country (Kennedy et al., 2015; McDonald & Kennedy, 2004) what has been called the "healthy immigrant effect". However, evidence suggests that this is not the case for forced migrants fleeing conflict (Zimmerman et al., 2011), who typically experience higher rates of health problems such as mental disorders (Fazel et al., 2005), and have less resilient mental health than labor migrants (Lindert et al., 2009). Additionally, the mental health of asylum seekers with temporary protection is typically worse than that of refugees who have permanent residence cards (Momartin et al., 2006). Physical

health problems reported are infections, diseases of the blood, cardiovascular diseases (World Health Organization, 2022b), as well as physical chronic conditions like severe neck/shoulder problems, severe/chronic back complaints, and migraine/severe headaches (Gerritsen et al., 2006).

According to the World Health Organization's Constitution, mental health is a crucial component of overall health and well-being (World Health Organization, 2021) and not just the absence of disease or infirmity. Posttraumatic stress disorder (PTSD), depression, and anxiety are highly prevalent in adult refugees and asylum seekers and are sustained many years after displacement (Blackmore et al., 2020). These mental conditions are linked to situations such as increased pre-migration trauma exposure, post-migration stress, and low post-migration socioeconomic level (Bogic et al., 2015). Refugees and asylum seekers may have experienced traumatic events during their flight, including torture, family loss or separation, conflicts, a frightening trip to safety, extended waiting times for sanctuary to be processed, economic uncertainty, insecure post-displacement accommodation, and difficulties adjusting to a new culture (Porter & Haslam, 2005; Steel et al., 2009). In comparison to the general population, refugees resettled in western nations may have a ten times higher risk of post-traumatic stress disorder. Furthermore, major depression affects approximately one in twenty individuals, and generalized anxiety disorder about one in twenty-five, with many people suffering from both conditions (Fazel et al., 2005).

People with PTSD, adopt high-risk behaviors like smoking, medication non-adherence (Zen et al., 2012), alcohol dependence (Adams et al., 2006), and less frequently well-established preventive practices such as physical activity (Rosenbaum et al., 2015) and healthy diet (Atayoglu et al., 2023). High-risk behaviors following PTSD symptoms have been associated with an increased risk of cardiovascular diseases (Boscarino, 2012) and other physical health problems (Heppner et al., 2009), thus showing that PTSD is not only associated with mental health (Zen et al., 2012).

The health of refugees is crucial primarily because everyone has the right to health, but also because they actively contribute to the development of both their host society and their home

countries. Thus, timely access to high-quality health care is an effective way to prevent illness and save resources on medical expenses as well as protect the citizens in the host country (WHO, 2019). Research on the general population also suggests that early interventions are important, as it is possible to prevent PTSD memory consolidation and, as a consequence, chronic PTSD (Boscarino et al., 2011). Moreover, due to the high and long-lasting occurrence of PTSD and depression among refugees and asylum seekers, the necessity of providing continued, long-term mental health care consistently after the first time of resettlement is also important (Blackmore et al., 2020), as limited access to health care would eventually have a greater cost than securing regular access to it (Bozorgmehr & Razum, 2015).

Physical and mental health is promoted and protected by regular physical activity for people of all ages and capacities. Regular physical activity is proven to lower the risk of premature death, aid in the prevention of many chronic diseases (Warburton, 2006), and is associated with better health outcomes and better quality of life (Penedo & Dahn, 2005). The benefits of physical activity for mental health, include, among others, the prevention of cognitive decline and the alleviation of mental disorders (World Health Organization, 2022). In particular, physical activity interventions have proven an effective tool in lowering depressive symptoms, anxiety, and PTSD in clinical and non-clinical populations (Björkman & Ekblom, 2022; Craft et al., 1998, Rebar et al., 2015; Schuch et al., 2016). Thus, physical activity can serve as a beneficial additional treatment to standard therapy, and it is recommended for mental disorders (Morres et al., 2019; Rosenbaum et al., 2014).

Research is in line that clinicians should recommend physical activity therapies to patients to enhance outcomes for both mental and physical health not only for the general population but also for migrant populations, including refugees and asylum seekers (Purgato et al., 2021). Although research on this population is limited it has been documented that insufficient physical activity is prevalent among refugees and asylum seekers (Devlin et al., 2012). Expectedly, asylum seekers encounter obstacles when it comes to undertaking physical activity, including their conditions of living as asylum seekers, lack of

knowledge of where to exercise, and cultural differences (Devlin et al., 2012; Haith-Cooper et al., 2018). Given the very prolonged duration of the asylum-seeking processes, an enhanced emphasis on the assessment and promotion of physical activity is justified and emphasized as being particularly essential (Nilsson et al., 2021). A meta-analysis (Purgato et al., 2021) of the few physical activity interventions in migrant populations has supported the beneficial effects of physical activity in lowering psychological symptoms – primarily PTSD, depression, and anxiety. Closely linked to the purposes of the present study, Knappe et al., (2019), in a non-controlled, pilot, 8-week exercise and sport intervention in a Greek refugee camp, found that a higher participation rate was associated with post-intervention improvements in hand grip strength, cardiovascular fitness, self-perceived fitness, and health-related quality of life. PTSD and depressive symptoms also showed a non-significant trend, with a higher participation rate being linked to less complaints following the intervention.

In addition to physical activity, perceived fitness has been also found to be linked with mental health status. Relevant studies have shown that perceptions of health are independent predictors of health outcomes even when measures of actual health are taken into account. Accordingly, it has been argued that many of the advantages of exercise can be, at least partially, explained by expectancy effects, rather than actual physical fitness (Plante et al., 1999). Overall, the research on the link between physical fitness and mental health has shown that engaging in regular physical activity is linked to higher psychological health in general (Plante et al., 2000).

Considering the prevalence of mental health disorders and the poor well-being of asylum seekers and refugees (Blackmore et al., 2020), the well-documented value of physical activity as an important complementary treatment for improving mental health (Rosenbaum et al., 2014), and the need for timely diagnosis and treatment in the displaced population (World health organization, 2019) in combination with the lack of evidence from camp settings, the present study aimed at exploring the relationships between mental health indices and physical activity variables in asylum seekers residing in

a refugee camp in Greece following their flight. In particular, the purpose of the study was to explore in the targeted population (a) the prevalence of mental health disorders, including PTSD, depression, and anxiety, and the levels of well-being, and (b) the relationship of the above mental health indices with self-reported physical activity and perceived fitness.

Methods

The study is part of a larger project involving a randomized controlled pragmatic trial on the effects of sport and exercise on mental health indices (Gerber et al., 2021). In this manuscript data from the baseline assessment have been analyzed with a focus on the prevalence of, and the relationships between, physical activity and mental health indices. The sampling and the procedures of the present study were based on the sampling and the procedures described by Gerber et al. (2021) in the registration of the project.

Context and Participants

Participants were sampled from the "Koutsochero" camp in central Greece. Asylum seekers in Greece reside in specially designed structures (mass camps consisting of containers or tents for housing facilities) where, depending on the legal conditions of the respective government of Greece, they may be free to be absent for long periods (e.g. to travel within the country) or have limited time away from the structure. These structures are controlled by governmental migration services. At the onset of the study, the camp was hosting 1376 asylum seekers. Among them, 819 were men and 557 were women coming mainly from Afghanistan (45.28%), Syria (24.93%), Iraq (7.41), Sub-Saharan countries (13.66%) mostly Congo and Somalia. The inclusion criteria for this study were that participants were between 16 and 59 years of age and could understand Farsi, Arabic, English, or French, as these were the most prevalent languages in the camp for which the questionnaires were available. These criteria reduced the target population to 877 people. The sample of the study consisted of 151 asylum seekers (76 females, 75 males), 17.22% of the target population, who were randomly selected and completed a face-to-face survey.

Among the participants, 103 were Asian and 48 were African. Their mean age was 28.90 (SD 9.31) years, they were displaced from their countries for an average of 33.32 (SD 36.49) months and were residing in the camp for an average of 13.84 (SD 9.96) months. Among them, 49 were in the camp without any family/relatives, whereas 69 were with family/relatives (no data were provided by 33 participants).

Instruments

Post-Traumatic Stress Disorder

Post-traumatic stress disorder was measured with the 22-item Impact of Event Scale-Revised (IES-R) which assesses the subjective distress brought on by traumatic situations (Weiss & Marmar, 1997). Items match 14 of the 17 PTSD symptoms listed in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-DSM-IV-the official manual of the American Psychiatric Association (Guze, 1994), and have demonstrated good psychometric properties (Weiss & Marmar, 1997).

Respondents were asked to think of difficulties people have after stressful life events (such as migration, flight from home country, torture) and rate how distressed they felt about them within the previous seven days (e.g., "Any reminder brought back feelings about it"), on a 5-point scale, from 0 ("not at all") to 4 ("extremely"), with higher scores indicating worse levels of PTSD. The IES-R provides a total score that ranges from 0 (no concern) to 88 (severe) and a cut-off mean score of 1.5 (equivalent to a total score of 33) indicates a preliminary diagnosis of PTSD (Creamer et al., 2003). The scale is available in Arabic (Davey et al., 2015), Farsi (Iranmanesh et al., 2015), and French (Brunet et al., 2003), and has been used in previous research with refugees (Morina et al., 2013).

Depression

Depressive symptoms were measured with the 9-item Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001, p. 9). Participants were asked to answer how bothered they were, over the last two weeks, by the listed problems (e.g., "Little interest or pleasure in doing things"), on a 4-point scale from 0 (not at all) to 3 (nearly every day), with higher scores indicating worse levels of depression;

scores between 10 and 14 indicate moderate depression, 15-19 moderate to severe depression, and scores 20 or above severe depression. The PHQ-9 has been translated into Arabic (AlHadi et al., 2017), Farsi (Dadfar, Kalibatseva, et al., 2018), and French (Arthurs et al., 2012), and has previously been used with populations of refugees (Feyera et al., 2015).

Anxiety

Anxiety symptoms were assessed with the 7-item General Anxiety Disorder (GAD-7) scale (Spitzer et al., 2006). Participants were asked to evaluate how often during the last two weeks have been bothered by the listed problems (e.g., “feeling nervous, anxious, or on edge”), on a 4-point scale from 0 (not at all) to 3 (nearly every day), with higher scores indicating worse levels of anxiety; scores between 10-14 indicate moderate anxiety whereas score 15 or above indicate severe anxiety. The scale is available in Arabic (Sawaya et al., 2016), Farsi (Omani-Samani et al., 2018), and French (Micoulaud-Franchi et al., 2016) and has been previously used in refugee populations (Georgiadou et al., 2018).

Psychological Well-being

Psychological well-being was assessed with the 5-item World Health Organization Well-being Index (World Health Organization, 1998). The WHO-5 contains five positive phrased items (e.g., “I have felt cheerful and in good spirits”) asking participants to evaluate how well each of the statements applies to them, during the last two weeks, on a 6-point Likert scale from 0 (at no time) to 5 (all the time), with lower scores indicating worse well-being; scores below 12.5 indicating poor well-being. The WHO-5 has been translated into more than 30 languages and has been used in research studies worldwide since its first release. The instrument is available in Arabic (Sibai et al., 2009), Farsi (Dadfar et al., 2018), and French (Hochberg et al., 2012).

Perceived Fitness

A single-item measure (“how would you rate your present level of fitness compared to other people of your age”; Plante et al., 1999) was used to evaluate perceived fitness on a scale from 1 (poor fitness) to 10 (excellent fitness).

Physical activity

Self-reported Physical Activity was assessed with the International Physical Activity Questionnaire Short Form (IPAQ-SF; Craig et al., 2003). The IPAQ-SF is a 7-day recall instrument including seven questions assessing frequency (days/week) and duration (minutes/day) of light, moderate, and vigorous physical activity, and also sedentary time per day. The IPAQ-SF is available in Arabic, Farsi, and French (IPAQ has been previously used in refugee populations (Andersen et al., 2021).

Procedures

The research adhered to the ethical standards specified by the Helsinki Declaration and was approved by the Ethics Committee of the Institution of the first author (ref approval no. 1701) and the ethical review board of Northwest and Central Switzerland (ref approval no. AO_2020-00036).

Permission for the realization of the study was granted by the refugee camp manager and the Greek Ministry of Migration and Asylum. The camp management provided an anonymous list of camp residents including sociodemographic information and participants was randomly selected. The data collection took place at the facilities of the university, where participants were transported in groups. Participants were informed about the purpose and the procedures of the study and signed written consent forms that were provided in their native language (Arabic, Farsi, English, or French).

Questionnaires including sociodemographic data and the psychometric measures described in the previous section were completed by the participants. Cultural interpreters from the population of the camp facilitated the communication between the researchers and the participants for the data

assessment and were also available during the questionnaire completion to overcome literacy and facilitate the understanding of the questionnaires for participants with limited language skills.

Results

Preliminary analyses

Descriptive statistics and Cronbach's alpha coefficient for the psychometric variables are presented in Table 1. Generally, participants scored high on the psychopathological variables (PTSD, depression, and anxiety) and low on well-being. Regarding PTSD, 50% of participants had a total IES score higher than 33, which is characteristic of a positive PTSD diagnosis. Regarding depression, 54% of participants had a total PHQ score higher than 10, which reflects moderate to severe depression symptoms. Regarding anxiety, 49% of participants had a total GAD score higher than 10, which reflects moderate to severe anxiety symptoms. Finally, regarding well-being, 49% of participants had a total WHO-5 score lower than 13, which is indicating rather poor well-being. Regarding their physical variables, participants scored high on self-reported physical activity, with some participants having scores that exceeded the recommended acceptable IPAQ values (IPAQ, 2004), and moderately to high on perceived fitness.

All mental health variables were strongly intercorrelated, with PTSD, depression, and anxiety having positive relationships between them, and negative with well-being. Somewhat unexpectedly, PTSD, depression, and anxiety were not related to self-reported physical activity but were negatively related to perceived fitness, which was also positively related to well-being and self-reported physical activity. Finally, no relationships were found for sedentariness.

Demographic factors

Correlations were calculated to examine relationships between psychometric variables and age, months in flight, and months in the camp. Regarding the mental health variables, the analysis showed that age was positively linked with PTSD, depression, and anxiety; no relationships were identified

between months in flight and months in the camp with any of the mental health variables. Regarding the physical variables, the analysis showed that age was negatively related to self-reported physical activity variables, but not related with perceived fitness; months away and months in the camp were not significantly related to any of the physical variables; yet weak positive correlations were found between months in the camp and all physical variables. These correlations are presented in Table 2.

Analyses of variance were conducted to test for differences in all examined variables as a function of sex, continent of origin (Asia, Africa), and presence of other family members in the camp (alone, with family). Regarding sex, the analysis for the mental health variables revealed a significant multivariate main effect, $F(4, 134) = 3.75, p = .006$. Examination of the univariate effects showed significant effects for PTSD, $F(1, 139) = 10.10, p = .002$; depression, $F(1, 139) = 10.56, p = .001$; anxiety, $F(1, 139) = 13.27, p < .001$; and well-being, $F(1, 139) = 6.03, p = .015$. Women scored higher than men on PTSD, depression, and anxiety and lower on well-being. Furthermore, the analysis for the physical variables revealed a significant multivariate sex effect, $F(4, 114) = 3.74, p = .004$. Examination of the univariate effects showed a significant effect for perceived fitness, $F(1, 120) = 15.82, p < .001$, and non-significant effect for self-reported physical activity; for LPA, $F(1, 120) = 0.17, p = .68$, for MPA, $F(1, 120) = 3.48, p = .06$, for VPA, $F(1, 134) = 0.69, p = .41$; for sedentariness, $F(1, 120) = 1.84, p = .18$.

Regarding continent, the mental health variables revealed a significant multivariate main effect, $F(4, 134) = 7.04, p < .001$. Examination of the univariate effects showed a significant effect for anxiety, $F(1, 139) = 13.27, p < .001$, with those from Asia scoring higher than those from Africa. No significant effects were shown for PTSD, $F(1, 139) = 1.26, p = .26$, depression, $F(1, 139) = 2.71, p = .10$, and well-being, $F(1, 139) = 1.05, p = .31$. Furthermore, the analysis for the physical variables revealed a significant multivariate sex effect, $F(5, 114) = 6.58, p < .001$. Examination of the univariate effects showed significant effects for self-reported physical activity, with Africans reporting higher levels of physical activity and lower levels of sedentariness than Asians.; for LPA, $F(1, 120) = 7.96, p = .006$, for MPA, $F(1, 120) = 10.11, p = .002$, for

VPA, $F(1, 120) = 8.49, p = .004$, for sedentariness, $F(1, 120) = 11.13, p = .001$. A non-significant effect was shown for perceived fitness, $F(1, 120) = 3.30, p = .07$.

Regarding the presence of other family members in the camp, the analysis revealed a significant multivariate main effect, $F(4, 103) = 5.87, p < .001$. Examination of the univariate effects showed significant effects for depression, $F(1, 106) = 4.35, p = .039$, and anxiety, $F(1, 106) = 12.87, p = .001$, with those with family scoring higher than those alone in the camp. No significant effects were shown for PTSD, $F(1, 106) = 2.73, p = .10$, and well-being, $F(1, 106) = 0.73, p = .40$. Furthermore, the analysis for the physical variables revealed a non-significant multivariate effect, $F(5, 88) = 1.31, p = .27$. For perceived fitness, $F(1, 94) = 0.48, p = .49$; for LPA, $F(1, 94) = 1.80, p = .18$; for MPA, $F(1, 94) = 0.77, p = .38$; for VPA, $F(1, 94) = 0.42, p = .52$; for sedentariness, $F(1, 94) = 3.39, p = .07$. Descriptive statistics for the group comparisons appear in Table 3.

Mental health physical activity and perceived fitness

A hierarchical regression analysis was calculated to test the degree to which self-reported physical activity and perceived fitness could predict well-being. In the first step, the self-reported physical activity was entered, i.e., LPA, MPA, VPA, and sedentariness, whereas in the second step perceived fitness was entered in the model. The analysis showed that self-reported physical activity could explain 15% of the well-being variance, $F(4, 118) = 6.15, p < .001$, with LPA being the sole significant predictor (beta: .21, $p = .048$) and sedentariness approaching significance (beta: -.16, $p = .061$). The introduction of perceived fitness in the second step significantly raised the prediction to 26% of the well-being variance, $F(5, 118) = 9.35, p < .001$. Perceived fitness was the strongest predictor (beta: .38, $p < .001$), while LA remained significant (beta: .21, $p = .026$).

Discussion

The present article addresses the call for studying mental health in asylum seekers early following their flight, upon their arrival to the host countries where they are seeking sanctuary. Most studies have

focused on post-migratory stress measured after the resettlement of refugees (when those seeking asylum have been already granted a long-term or temporary residence permit), thus early assessment and interventions in the mental health of asylum seekers have been neglected (Solberg et al., 2020). Early identification of the mental condition could help timely, and thus more effective, intervention and therapy of mental health problems (Boscarino et al., 2011; WHO, 2019). Accordingly, the study aimed to explore the state of mental health in asylum seekers living in asylum-seeker camp in central Greece following their flight and examine relationships of mental health indices with self-reported physical activity and perceived fitness. Overall, the results confirmed previous findings (Blackmore et al., 2020), with asylum seekers showing rather poor mental health, showed that mental health status varied as a function of sex, continent of origin, and the presence of family, and revealed associations between perceived fitness and the mental health indices, and between physical activity and well-being but not mental health disorders.

Prevalence of mental health disorders and physical activity

Several studies have explored the mental health of refugees and asylum seekers with a large intersurvey variability (Steel et al., 2009). In their meta-analysis of the existing evidence Steel et al. reported that the prevalence rate for PTSD and depression across all surveys were 30.6% and 30.8% respectively. The duration since conflict and the perceived level of political fear was identified among others as important moderators of PTSD. In the current study, the prevalence rates were higher (for PTSD 50% and for depression 54%) but still comparable to Solberg et al's (2020) study, which particularly sampled asylum seekers and reported high percentages for PTSD (63%) and depression (67,9%), thus justifying the different status of asylum seekers compared to refugees with permanent status who generally have better mental health status (Momartin et al., 2006). Nilson's study with asylum seekers in Sweden also showed high rates of PTSD, with 61% reporting above or equivalent to the recommended cut-off (Nilsson et al., 2021). Additionally, Poole's study, on asylum seekers residing in Greek asylum-seeking settlers found a higher prevalence (44%) than that identified in the existing literature for major

depression (Poole, 2018). Concerning PTSD, our study showed that 50% of the participants scored above the cut-off point of 33 in IES-R, which has been suggested to significantly impair one's immune system and have long-lasting implications for health (Kawamura et al., 2001). In terms of anxiety, 49% of our participants had moderate to severe levels of anxiety, which is consistent with severe outcomes in Bogic's systematic review (Bogic et al., 2015). Interestingly, however, in a study conducted on five Greek asylum-seeking settlers (Ben Farhat et al., 2018), the majority of the participants reported anxiety disorder at higher rates, ranging from 74.6% to 92%. Qualitative data from that study evidenced that, in addition to the traumatic events they experienced in pre-peri- and post-migration periods, it was their lives in the Greek camps, which were full of uncertainty, that contributed to their poor mental well-being (low quality of life, living in poor-isolated settled camps, being separated from family, etc.). This could further explain the constantly higher rates of disorders in asylum seekers compared to resettled refugees. Finally, 49% of the participants reported well-being below the threshold of poor well-being, as identified by the WHO as requiring inspection for depressive symptoms, which is in accordance with the findings from studies on Sudanese refugees (Tempany, 2009) and newly arrived refugees in Sweden (Sjögren Forss et al., 2021). The high correlations identified between the different mental health disorders, supports in addition the high prevalence of comorbidities.

Limited research exists regarding physical activity and perceived fitness in the refugee population and asylum seekers residing in refugee camps, with some evidence indicating low levels of physical activity (Andersen et al., 2012; Nilsson et al., 2021). Our findings showed moderate perceptions of fitness among participants, who however, considering the recommendations of the WHO for adults (150 – 300 minutes of moderate-intensity, or 75-150 minutes of vigorous-intensity physical activity or some equivalent combination of the two, weekly) (Bull et al., 2020) reported rather high levels of moderate and vigorous physical activity. A possible explanation may be that participants overestimated their physical activity levels, a tendency that has been identified by Vancampports's meta-analysis where patients with severe

mental illnesses, such as depression, tended to overestimate or over-report physical activity and underestimate their sedentary behavior compared to objectively measured physical activity. Subsequently, Vancampfort argued that relying solely on self-reported activity may result in inaccurate assessments of physical activity in those with severe mental illness, which may be exacerbated by cognitive impairment, which is frequently present in those populations (Vancampfort et al., 2017). With regard to the integrity of the IPAQ-SF, Craig et al., (2003) argued that its measuring properties are satisfactory, or at least comparable to those of other well-known self-reports. Nevertheless, Lee et al., (2011) in their systematic review claimed that in the vast majority of investigations, the correlation between the IPAQ-SF and objective measures of activity was low, with self-reports showing overestimated physical activity. In the current study, after piloting five participants with the IPAQ-long form and the IPAQ-Short Form it was decided to use the IPAQ-SF questionnaire, as the long form required too much time and effort from the participants and the interpreters who assisted with the procedure, thus risking limited reliability. Accordingly, It has been argued that the trade-off might be worthwhile if one instrument is marginally less accurate than another but requires significantly less time to operate (Magwood et al., 2023), because if the screening procedure takes too long or if the inquiries are intrusive, there is a potential risk of re-traumatization for the individuals who are being examined.

Nonetheless, without undermining the issues identified above, it is also possible that physical activity was not all that overreported but was due to the particularities of the camp life. This would include the lack of spacious living facilities (small containers where four or more people/families were fitted), and the isolated camp placement, with the closest village for shopping essentials being a 20-minute walk away. These factors are likely to make residents spend more time outdoors, engaging in a more physically active daily routine. This may have also created a perception of excessive physical activity by participants.

Considering demographic factors, females and older participants reported higher levels of mental health disorders and lower well-being compared to males and younger participants, which is in line with

previous research findings (Blackmore et al., 2020; Porter & Haslam, 2005). Furthermore, participants from Asia, compared to those from Africa, showed a trend for higher levels of mental health disorders, with anxiety symptoms only differing significantly which is consistent with previous evidence (Blackmore et al., 2020). Additionally, participants residing in the camp with family reported higher levels of depression and anxiety compared to participants residing in the camp alone, which has been attributed to housing problems and financial pressures (Poole, 2018). Regarding the physical variables, males, compared to females, scored higher on perceived fitness, but not on self-reported physical activity, in contrast with the results from a study with asylum seekers in Sweden, where women reported lower levels of physical activity than men (Nilsson et al., 2021). Finally, Africans reported higher levels of physical activity and lower levels of sedentariness than Asians, possibly reflecting cultural background differences between the two populations.

Relationships between mental health indices and perceived fitness

The analyses regarding mental health variables and physical activity revealed weak relationships. Considering the compelling evidence supporting emphatically the beneficial effects of physical activity on PTSD, depression, and anxiety (Morres et al., 2019; Rosenbaum et al., 2014), and in addition similar studies with refugee populations, the present findings seem rather unexpected. It could be argued that the issues identified regarding IPAQ may partly explain these findings, nonetheless, the relationship between self-reported physical activity and well-being matches the relevant literature and so does the relationship between self-reported physical activity and perceived fitness, thus weakening such claims. Further to that, our participants were asylum seekers living in a refugee camp with poor living conditions and uncertainty regarding their immediate future, which may have attenuated the expected beneficial effects on mental health. Still, the results showed that self-reported physical activity was linked to well-being. Interestingly, among the different levels of physical activity, it was the LPA that showed the strongest relationship. The regression analysis also pointed out the importance of perceived fitness, as a stronger predictor of well-

being compared to physical activity. Perceived fitness plays a crucial role in mental health outcomes. It has been postulated that one's perception of fitness, rather than objective measurements of one's actual physical fitness, may be the cause of the good psychological effects associated with exercise (Plante et al., 2000). Examining a different variable, sleep-related problems, researchers found, as in our study, physical activity and perceived fitness correlated, yet, only perceived fitness was linked to better sleep, urging the authors to suggest that physical activity and sleep might be a "mental affair" (Gerber et al., 2010). Notwithstanding the limitations of our study, presented below, this may be a viable explanation; that it is the perceptions of things and not the things per se that determine psychological states.

Limitations

Two issues, in particular, require consideration with regard to the interpretation of the findings; the concerns regarding the IPAQ-SF that were discussed above, and the illiteracy among several participants. Concerning the IPAQ-SF, the interpretation of the present findings should be considered with caution; furthermore, the issue raises the need for more precise measurement tools (Soundy, 2014). Moreover, similar inquiries with objective measures of physical activity are warranted to enhance our confidence in the results and our understanding of the relationship between physical activity and mental health in such populations.

The second issue for consideration involved the limited language skills of some participants. Translators/interpreters were invited to facilitate the communication between the researchers and the participants, but also to assist participants with limited reading and writing skills to complete the questionnaires. The involvement of the assistants was inevitable and may have influenced participants' replies; nevertheless, our goal was to have a representative sample of the camp population and this wouldn't have been the case if we had limited participants to people with language literacy only. Taken together, these limitations could partly explain the lack of expected relationships between levels of physical activity and mental health indices; yet, the relationships between IPAQ-SF and well-being, IPAQ-

SF and perceived fitness, as well as those between perceived fitness, well-being and the mental health variables, which were all in the expected direction, seem to counter such an argument.

Conclusion

The findings confirm poor mental health for asylum seekers living in a refugee camp in Greece. The study provides useful evidence regarding the link between mental health and physical activity with physical activity linked to better well-being. Total Self-reported physical activity (IPAQ) positively related to well-being. Sedentary behaviour is positively related to anxiety but not related to PTSD, depression, and well-being. Perceived fitness positively related to Well-being and negatively related to PTSD, Depression, and Anxiety. Females reported worse levels of PTSD, depression, anxiety, and well-being than males. Participants with family reported worse levels of depression and anxiety than those without family.

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Table 1. Descriptive statistics, reliability, and correlations.

	Descriptives		Alpha	Correlations								
	Mean	SD		1	1a	1b	1c	2	3	4	5	
1. PTSD_total	34.64	22.39	.94	-								
a. intrusion	12.40	8.68	.88	.95**	-							
b. hyperarousal	9.25	7.04	.86	.91**	.82**	-						
c. avoidance	13.00	8.68	.84	.91**	.79**	.72**	-					
2. Depression	10.76	7.36	.86	.66**	.63**	.72**	.50**	-				
3. Anxiety	9.28	6.58	.90	.67**	.65**	.75**	.47**	.79**	-			
4. Well-being	13.47	7.18	.88	-.38**	-.37**	-.43**	-.28**	-.56**	-.47**	-		
5. Perceived Fitness	6.88	2.50	-	-.24**	-.27**	-.27**	-.12	-.38**	-.39**	.46**	-	
6. LPA	403.69	367.74	-	.06	.04	.05	.07	-.01	-.02	.30**	.17	
7. MPA	279.78	346.62	-	-.02	-.01	-.03	-.02	-.04	-.05	.23**	.29**	
8. VPA	289.38	352.37	-	.09	.05	.07	.14	-.01	-.10	.24**	.36**	
9. Sedentariness	253.01	198.58	-	.01	-.04	.06	.01	.10	.18*	-.08	-.14	

Note: MPA Moderate intensity Physical Activity; VPA: Vigorous Physical Activity; LPA: Low intensity Physical Activity

Table 2. Correlations of mental and physical variables with demographics.

	Age	Months since flight	Months in the camp
PTSD_total	.21*	-.02	-.07
Depression	.19*	-.07	.07
Anxiety	.29**	.01	-.02
Well-being	-.07	.09	.07
Perceived Fitness	-.08	-.01	.11
LPA	-.20*	.06	.17
MPA	-.16	.08	.11
VPA	-.20*	.03	.17
Sedentariness	.20*	-.04	-.06

Note: LPA: Low intensity Physical Activity; MPA: Moderate intensity Physical Activity; Vigorous Physical Activity.

Table 3. Group differences

	Sex		Continent		In camp with	
	Men	Women	Asia	Africa	Without family	With family
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD
Psychological variables						
PTSD_total	30.32 ± 21.87	42.21 ± 22.09	37.10 ± 22.62	32.22 ± 22.81	31.03 ± 20.97	38.87 ± 23.20
Depression	9.73 ± 6.61	13.51 ± 7.07	12.06 ± 7.20	9.85 ± 6.46	9.29 ± 6.86	12.59 ± 6.90
Anxiety	7.49 ± 6.16	11.42 ± 6.52	10.48 ± 6.83	6.05 ± 4.63	6.15 ± 5.51	10.78 ± 6.36
Well-being	14.24 ± 7.03	11.32 ± 6.91	13.27 ± 7.01	11.87 ± 7.35	12.34 ± 7.30	13.89 ± 7.64
Physical variables						
LPA	443,25 ± 379.41	415,16 ± 356.93	479,89 ± 388.92	262,6786 ± 215.68	385,44 ± 303.52	495,33 ± 418.85
MPA	366,16 ± 369.23	245,00 ± 341.40	361,03 ± 380.40	123,3929 ± 190.53	301,61 ± 302.67	372,08 ± 409.43
VPA	334,33 ± 362.33	279,83 ± 358.41	358,31 ± 378.03	138,7500 ± 225.61	302,20 ± 351.67	355,25 ± 3998.28
Sedentariness	225,33 ± 154.47	266,66 ± 178.22	272,98 ± 174.27	157,3214 ± 102.20	192,64 ± 124.47	254,00 ± 170.01
Perceived fitness	7,71 ± 2.33	6,03 ± 2.30	7,09 ± 2.46	6,1429 ± 2.33	6,82 ± 2.70	7,20 ± 2.42

Note: LPA: Low intensity Physical Activity, MPA Moderate intensity Physical Activity; Vigorous Physical Activity

Table 4. Hierarchical regression analyses for well-being.

	beta	t	p	R ²	F
Step 1				.18	(4,118) = 6.15**
LPA	.21	1.99	.048		
MPA	.09	0.82	.411		
VPA	-.05	-0.55	.585		
Sedentariness	-.16	-1.89	.06		
Step 2				.26	(5, 118) = 9.35**
LPA	.22	2.26	.026		
MPA	.05	0.47	.642		
VPA	.02	-0.55	.851		
Sedentariness	-.11	-1.31	.192		
Perceived Fitness	.38	4.29	<.001		

* p< .05; **p< .01;

Note: LPA: Low intensity Physical Activity; MPA: Moderate intensity Physical Activity;
VPA: Vigorous Physical Activity