Povezanost mentalnog zdravlja i fizičke aktivnosti

/ The Relationship Between Mental Health and Physical Activity

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Mentalno zdravlje je podložno brojnim vanjskim utjecajima. Među njima, kao i u domeni fizičkog zdravlja, vrlo bitan čimbenik je i fizička aktivnost. Fizička aktivnost može različitim mehanizmima djelovanja na patofiziološkoj, ali i psihološkoj razini, utjecati na mentalno zdravlje, a potencijalno i na rizik za razvoj različitih psihičkih poremećaja, pa čak poslužiti i kao metoda njihova liječenja. U ovom radu prikazujemo važnost fizičke aktivnosti za opće mentalno zdravlje, kao i za pojedine psihičke poremećaje – depresiju, anksioznost i psihozu s fokusom na shizofreniju te njenu implementaciju u psihičke poremećaje. Uz mehanizme djelovanja fizičke aktivnosti na mentalno zdravlje naglasak je stavljen i na specifikacije vezane uz njeno provođenje, tj. oblik, intenzitet i trajanje.

/ Mental health is subject to numerous external influences. Among them, as in the domain of physical health, physical activity is a very important factor. Through various mechanisms of action on a pathophysiological but also psychological level, physical activity can have an effect on mental health and potentially also on the risk of developing various mental disorders, and can even serve as a method for their treatment. In this study, we will present the importance of physical activity for general mental health as well as for certain mental disorders – depression, anxiety and psychosis, with a special focus on schizophrenia. In addition to the mechanisms of action of physical activity on mental health, emphasis will be placed on the specifics related to its implementation, more precisely its form, intensity and duration.

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UVOD

Svjetska zdravstvena organizacija (SZO) definira fizičku aktivnost kao oblik tjelesnog pokreta proizvedenog skeletnim mišićima, koji zahtijeva potrošnju energije uključujući aktivnosti koje se provode tijekom rada, igre, obavljanja kućanskih poslova, putovanja te bavljenja rekreativnim aktivnostima. Termin „fizička aktivnost" ne bi se trebao fokusirati samo na „vježbanje" kao potkategoriju usmjerenu prema održavanju kondicije jer svaki oblik fizičke aktivnosti ima zdravstvenu korist (1). S obzirom da se fokus maknuo s kvantitete počela se preferirati diferencijacija fizičke aktivnosti i sedentarnog ponašanja kao neovisnih varijabli u odnosu na učinak na zdravlje. Što dulje osoba provede u sedentarnom ponašanju, to se osjeća manje energično za daljnje provođenje aktivnosti (2). Prednost ima obavljanje bilo kakve aktivnosti u odnosu na nikakvu aktivnost koja vodi u navikavanje na sedentarno ponašanje, bez obzira na njen intenzitet i trajanje (1). Tako bolji učinak na raspoloženje i mentalni status ima uzimanje pauza kod sedentarnog ponašanja u bilo kakvom aktivnom obliku s obzirom da epizode takvog ponašanja ≥ 30 minuta uzrokuju pogoršanje raspoloženja, pa moguće čak i fizičkog stanja uz slabost i vrtoglavicu. Nažalost, vrlo često posao primorava na svakodnevno dugotrajno sedentarno ponašanje, ali bi se u tim slučajevima trebalo promovirati uzimanje aktivnih pauza (2). Koristi fizičke aktivnosti se primarno promatraju kao pozitivan učinak na fizičko zdravlje, ali se sve više fokus usmjerava i na mentalno zdravlje. Fizička aktivnost potencijalno smanjuje rizik od hipertenzije, koronarne bolesti srca, inzulta, dijabetesa i raznih vrsta karcinoma uključujući karcinom dojke i kolona, ali i depresije kao prvog u ovom kontekstu navedenog psihičkog poremećaja od strane SZO-a (1,3).

Preporuke SZO-a koje savjetuju provođenje barem 150 odnosno 75 minuta fizičke aktivnosti srednjeg odnosno jakog intenziteta na tjedan

INTRODUCTION

The World Health Organization (WHO) has defined physical activity as a form of physical movement produced by skeletal muscles that requires energy – including activities during work, play, housework, travel and recreational activities. The term "physical activity" should not exclusively focus on "exercise" as a subcategory that aims to maintain physical fitness, because every form of physical activity has health benefits (1). Given that the focus has been redirected from quantity, it became preferable to differentiate physical activity and sedentary behavior as independent variables in relation to health. The longer the person spends in sedentary behavior, the less he or she feels energetic enough to further carry out physical activities (2). It is preferable to perform any kind of activity regardless of its intensity and duration over being completely inactive, which leads directly to habituation to sedentary behavior (1). Thus, taking breaks from sedentary behavior in any active form has a better effect on mood and mental status, since episodes of such behavior lasting ≥30 minutes can cause worsening of the mood and possibly even impoverishment of the physical condition followed by weakness and dizziness. Unfortunately, very often the nature of work forces a person to engage in daily long-term sedentary behavior, but in these cases taking active breaks should be considered (2). The benefits of physical activity are primarily observed through a positive effect on physical health, but an increasing focus is also being placed on mental health. Physical activity potentially reduces the risk of hypertension, coronary heart disease, stroke, diabetes and various types of cancer including breast and colon cancer, but also depression as the first mental disorder mentioned in this context by the WHO (1, 3).

WHO recommendations that advise at least 150 or 75 minutes of moderate or high intensity physical activity per week for adults (18-64

za osobe odrasle dobi (18 – 64 g.) te barem 60 minuta aktivnosti srednjeg do jakog intenziteta na dan za djecu i adolescente (5 – 17 g.) nisu specifične za prevenciju ili smanjenje rizika od razvoja pojedinih fizičkih i psihičkih poremećaja (1,3). Moguće je da bi s obzirom na depresiju ta razina aktivnosti mogla biti i niža, posebno zbog toga što su osobe koje pate od depresije pod većim rizikom od razvoja drugih psihičkih poremećaja pa će vjerojatno biti fizički neaktivnije ili će preferirati aktivnost niskog do srednjeg intenziteta. Posljedično, prevencija svakog pojedinog medicinskog stanja mogla bi zahtijevati različite obrasce i preporuke za provođenje fizičke aktivnosti što je gotovo nemoguće dizajnirati, ali bi i slalo zbunjujuću poruku općoj javnosti. Umjesto toga, važnije je da te preporuke budu percipirane od strane javnosti kao dostižne odnosno vrlo vjerojatno moguće provedive, jer u suprotnome često izazivaju suprotni učinak (3). Što se tiče trajanja same aktivnosti, studije su pokazale kako više nije uvijek bolje. Najpovoljniji učinak na mentalno zdravlje imaju vježbanje te sportsko-rekreativne aktivnosti poput biciklizma, rolanja, planinarenja, plivanja, pilatesa, joge i drugih, između 30 – 60 min, 3 – 5 x/tjedan, a ekstremno vježbanje duže od 90 min ili više od 23 puta/mjesec se prije povezuje s pogoršanjem mentalnog zdravlja (4). S druge strane, za određena stanja poput depresije moguće je da fizička aktivnost od čak 1 sat/tjedan ima pozitivan učinak na mentalno zdravlje (5).

Mentalnim zdravljem prema SZO-u smatra se stanje blagostanja u kojem pojedinac ostvaruje svoje vlastite sposobnosti, sposoban je nositi se s normalnim životnim stresovima, sposoban je produktivno i plodonosno raditi te dati doprinos svojoj zajednici. Dakle, to je stanje puno više od samog nepostojanja određenog psihičkog poremećaja (6). Postoje razni čimbenici koji utječu na stanje mentalnog zdravlja: od dobi, bračnog statusa, razine edukacije, primanja te statusa (ne)zaposlenosti pa do razine fizičke

years) and at least 60 minutes of medium to high intensity daily activity for children and adolescents (5-17 years), are not specific for the prevention or reduction of the risk of developing certain physical and mental disorders (1, 3). It is possible that this level of activity could be lower in the case of depression, especially because people who suffer from it have a higher risk of developing other mental disorders and are more likely to be physically inactive or to prefer physical activity of low to medium intensity. Consequently, the prevention of each individual medical condition could require different patterns and recommendations for the proper planning of multiple suitable physical activities, which is not only almost impossible to design but would also send a confusing message to general public. Instead, it is more important that these recommendations are perceived by the public as achievable or very likely to be carried out, because otherwise they often cause a countereffect (3). As for the duration of the activity itself, studies have shown that more is not always better. Exercise and sports recreational activities such as cycling, rollerblading, hiking, swimming, Pilates, yoga and others, lasting between 30-60 min ×3-5 / week have the most favorable effect on mental health, and extreme exercise longer than 90 min or more than ×23 / month is more often associated with deterioration of mental health (4). On the other hand, for certain conditions such as depression, it is possible that physical activity of as much as 1 h / week has a positive effect on mental health (5).

According to the WHO, mental health is considered to be a state of well-being in which an individual is capable of self-actualization through their own abilities, is able to cope with normal life stresses, work productively and fruitfully and contribute to their community. Thus, it is a condition comprising much more than the mere absence of a particular mental disorder (6). There are various factors that affect the state of mental health ranging from age, mar-

aktivnosti (7). Kako je ranije spomenuto, fizičkom aktivnošću se ne smatra samo vježbanje. Primarno se uvijek misli na fizičku aktivnost u slobodno vrijeme koja je studijama dokazano povezana s pozitivnim učinkom na mentalno zdravlje bilo da je u obliku vježbanja, rekreacije, putovanja, ali osim toga u obzir dolazi i fizička aktivnost koja se obavlja tijekom puta na posao ili u školu u obliku npr. hodanja ili vožnje biciklom (4,7,8). I taj oblik fizičke aktivnosti je tijekom studija povezan s pozitivnim učinkom na mentalno zdravlje (7,9,10). S druge strane fizička aktivnost koja se provodi na poslu je pokazala kontradiktorne učinke na mentalno zdravlje u različitim studijama. Kod određenih pojedinaca je utjecala negativno, a kod određenih pozitivno na mentalno zdravlje. Smatra se da je mogući uzrok negativnog učinka to što se takve aktivnosti smatraju obveznim zadatcima više nego voljnim aktivnostima te posljedično ne garantiraju osjećaj uživanja u njima, pa se ni ne mogu povezati s pozitivnim učinkom na mentalno zdravlje (7,10). Međutim, ti bi kontradiktorni učinci mogli imati podlogu i u individualnim razlikama pojedinaca odnosno načinu na koji različite podgrupe populacije percipiraju specifičnu fizičku aktivnost uz njen učinak na vlastito mentalno stanje. Tako se tijekom studije pokazalo kako ženama koje rade kao proizvodne radnice ("djelatnici plavog ovratnika") fizička aktivnost koja se provodi obavljanjem kućanskih poslova prouzrokuje visoku razinu stresa, jer je to nešto što moraju obaviti same nakon napornog radnog dana bez opcije zapošljavanja pomoći. S druge strane, kod žena koje su uredske radnice ("djelatnici bijelog ovratnika") razina stresa povezana s obavljanjem kućanskih poslova je puno niža jer ih one nužno ne moraju obavljati - mogu zaposliti kućnu pomoćnicu ili bolje podijeliti takve poslove međusobno (11).

Kada je riječ o opsegu provođenja fizičke aktivnosti na razini populacije, podatci su osigurani istraživanjem SZO-a o razini tjelesne aktivnosti

ital status, level of education, income and (un) employment status to the level of physical activity (7). As mentioned earlier, physical activity does not only include exercise. Primary, it is always meant to refers to physical activity in leisure time, which studies have proven to be associated with a positive effect on mental health, whether in the form of exercise, recreation, travel, etc., but physical activity performed during the trip to work or to school in the form of walking or cycling is also considered (4, 7, 8). Studies have also linked this form of physical activity with a positive effect on mental health (7, 9, 10). On the other hand, physical activity carried out at work has shown contradictory effects on mental health in various studies. It has had a negative effect on certain individuals and a positive effect on the mental health of others. A possible cause of the negative effect is considered to be the fact that such activities are considered mandatory tasks rather than voluntary activities and consequently do not guarantee a sense of enjoyment, so they cannot be associated with a positive effect on mental health (7, 10). However, these contradictory effects could also be based on the individual differences, specifically the way in which different population subgroups perceive a certain form of physical activity or its effect on their own mental state. Thus, one study showed that for women who work as production workers ("blue collar workers") physical activity carried out through housework caused high levels of stress because it is something they have to do on their own after a hard day's work without the option of hiring help. On the other hand, for women who are office workers ("white collar workers"), the level of stress associated with doing housework was much lower because they do not necessarily have to do it – they can hire a maid or divide housework among each other (11).

Regarding the quantity of physical activity on a population level, data have been provided by a WHO survey on the level of physical activity

u zemljama članicama EU kojim je obuhvaćena i Republika Hrvatska. Osim zdravstvenih djelatnika koji su obučeni za davanje savjeta o prehrani i fizičkoj aktivnosti, u RH postoji i nacionalni program "Živjeti zdravo". Također je bitna i uloga savjetovališta za pravilnu prehranu i fizičku aktivnost u sklopu HZJZ-a kao i 13 županijskih zavoda za javno zdravstvo. U sklopu istraživanja mjerena je razina fizičke aktivnosti po dobnim skupinama temeljena na preporukama SZO-a. Time se došlo do podataka da 88 % osoba dječje dobi, 19 % adolescenata, 16 % osoba odrasle dobi (18 - 64 g.) te svega 6 % osoba starije životne dobi (>65 g.) obavlja fizičku aktivnost u skladu s preporukama SZO-a u RH (12).

Osim RH istraživanje je provedeno u još 26 država EU te UK. Trend razine fizičke aktivnosti se većinom održava visokim u dječjoj dobi kao i u RH te pada prema odrasloj i starijoj životnoj dobi. Međutim, postoje države koje su tome potpuna suprotnost. Primjerice, stanovnici Austrije obavljaju fizičku aktivnost prema preporukama SZO-a u dječjoj i adolescentskoj dobi u svega 17 % slučajeva, u odrasloj dobi u čak 47 %, a u starijoj 24 %. Isti trend niskog postotka aktivnosti u dječjoj i adolescentskoj dobi te visokog u odrasloj te starijoj dobi u usporedbi s RH nalazi se i u Belgiji, Danskoj s izrazito niskim vrijednostima aktivnosti u dječjoj dobi (16 %) te adolescenciji (11 %), a izrazito visokim u odrasloj (72 %) i starijoj dobi (68 %), zatim u Estoniji, Francuskoj čiji su postotci vrlo slični onima u Danskoj, Latviji, Poljskoj, Španjolskoj te Švedskoj. S druge strane, podatci iz susjedne Slovenije pokazuju zavidne vrijednosti obavljanja fizičke aktivnosti u svim dobnim skupinama, od 88 % u dječjoj dobi, 69 % u adolescenata, 77 % u odrasloj dobi te 61 % u starijoj životnoj dobi (13).

Fizička aktivnost je među ovim državama promovirana od zdravstvenog osoblja u 75 % slučajeva, a u 88,5 % slučajeva je to od liječnika

in EU member states, which includes the Republic of Croatia. Besides health professionals who are trained to give advice on nutrition and physical activity, there is a national program in the Republic of Croatia called "Healthy Living". The Croatian Institute of Public Health as well as 13 county public health institutes also play an important role in counseling for proper nutrition and physical activity. As part of the study, the level of physical activity by age group was measured based on WHO recommendations. This showed that 88% of children, 19% of adolescents, 16% of adults (18-64 years) and only 6% of older people (>65 years) perform physical activity in accordance with WHO recommendations in the Republic of Croatia (12).

Besides the Republic of Croatia, the study was conducted in 26 other EU countries and the United Kingdom. The trend in the level of physical activity was mostly maintained as high in childhood as in the Republic of Croatia and declining towards adulthood and older age. However, there are countries that are the complete opposite. For example, only 17% of children and adolescent residents in Austria performed physical activity according to WHO recommendations, whereas this number was as high as 47% in adults and 24% in the elderly. The same trend of low percentage of physical activity in children and adolescents and high in adults and elderly was also found in Belgium and Denmark, with extremely low values of physical activity in children (16%) and adolescents (11%) and extremely high values in adults (72%) and elderly people (68%), and also in Estonia and France, where these percentages were very similar to Denmark, Latvia, Poland, Spain and Sweden. On the other hand, data from the neighboring Slovenia show enviable values physical activity through all age groups, from 88% in children, 69% in adolescents, 77% in adults and 61% in the elderly (13).

Physical activity is promoted by health professionals in 75% of cases among these states, and in 88-5% of the cases it is promoted by physi-

te u manjem postotku od medicinskih sestara, fizioterapeuta ili drugih djelatnika medicinske struke (14).

FIZIČKA AKTIVNOST I DEPRESIJA

Depresija je psihički poremećaj karakteriziran sniženim raspoloženjem u obliku dugotrajnog osjećaja tuge ili nemira i tjeskobe, izostanka uživanja u ranije ugodnim aktivnostima, visokog osjećaja bezvrijednosti ili krivnje, a u terminalnom obliku i mislima o samoozljeđivanju te pokušaju suicida. Negativno utječe na obavljanje jednostavnih svakodnevnih zadataka te posebno na odnose s obitelji i prijateljima, ali i na radnu sposobnost. Uključuje i somatske manifestacije poput manjka energije i apetita, nesanicu ili suprotno preveliku potrebu za snom te smanjenu koncentraciju. Prema posljednjim podatcima iz 2014.-2015. g. u RH je 5,1 % muškaraca te 6,2 % žena imalo depresiju (15). Depresija je psihički poremećaj u podlozi kojeg su opisane razne hipoteze. Najšire uvriježena je monoaminska hipoteza prema kojoj je depresija povezana sa smanjenom količinom monoamina u mozgu uključujući noradrenalin, dopamin i serotonin. Nadalje, hipoteza endorfina, posebno β-endorfina, ističe njihove pozitivne učinke, u ovom kontekstu primarno antidepresivne s mogućnošću potenciranja osjećaja euforije, ali i analgetske te antipiretske (16,17). Utjecaj fizičke aktivnosti može se primijeniti na obje navedene hipoteze. Tijekom provođenja fizičke aktivnosti dolazi do povećanog izlučivanja serotonina u mozgu te do pojačane sinaptičke transmisije (16,17). Osim toga, moguće je i da se redovitim vježbanjem povisuje i razina triptofana u mozgu kao glavne aminokiseline za proizvodnju setoronina (17). Prema hipotezi endorfina, endorfini se u značajnoj mjeri izlučuju tijekom fizičke aktivnosti (16,17). Spominju se u kontekstu razvoja osjećaja euforije poznatijem kao *Runner's High* odnosno opuštenom psihičkom stanju ponekad doživ-

cians and to a lesser extent by nurses, physiotherapists or other medical professionals (14).

PHYSICAL ACTIVITY AND DEPRESSION

Depression is a mental disorder characterized by lower mood in the form of prolonged feelings of sadness or restlessness and anxiety, lack of enjoyment of previously pleasant activities, intense feelings of worthlessness or guilt, and in the worst cases thoughts of self-harm and suicide attempts. It negatively affects the performance of simple daily tasks and especially relationships with family and friends, but also working ability. It also includes somatic manifestations such as lack of energy and appetite as well as insomnia or, conversely, excessive need for sleep and decreased concentration. According to the latest data from 2014-2015 in the Republic of Croatia, 5.1% of men and 6.2% of women suffer from depression (15). Depression is a mental disorder with various hypotheses on the underlying causes. The most widely accepted one is the monoamine hypothesis, according to which depression is associated with decreased amounts of monoamines in the brain including norepinephrine, dopamine and serotonin. Next is the endorphin hypothesis, with a focus on β-endorphin, which emphasizes its positive, primarily antidepressant effects with the possibility of potentiating feelings of euphoria, but also its analgesic and antipyretic effects (16, 17). The impact of physical activity can be applied to both of these hypotheses. During physical activity, there is increased secretion of serotonin in the brain and increased synaptic transmission (16, 17). In addition, it is possible that regular exercise increases the level of tryptophan in the brain, the main amino acid for the production of serotonin (17). Regarding the endorphin hypothesis, endorphins are significantly excreted during physical activity (16, 17). They are often mentioned in the context of the development of a euphoric feeling better known

ljenom tijekom intenzivnog vježbanja (17). Njihov učinak je najizraženiji nakon nekoliko mjeseci redovitog vježbanja zbog povećanja osjetljivosti organizma te se dulje zadržavaju u krvotoku (17). Studijama je i dokazano kako se vježbanjem povećava izlučivanje endorfina, ali nije sasvim jasno ima li to značajan učinak na raspoloženje. Takvi rezultati se potencijalno mogu pripisati tome da izmjerene plazmatske koncentracije endorfina ne korespondiraju vjerodostojno stvarnom stanju u središnjem živčanom sustavu (16).

Iz ranije navedenih fizioloških mehanizama koji se događaju tijekom fizičke aktivnosti, ali i patofiziološke podloge same depresije, moglo bi se zaključiti kako bi fizička aktivnost mogla potencijalno poboljšati stanje i kvalitetu života osoba koje pate od depresije. Međutim, odnos fizičke aktivnosti i depresije je dvosmjeran. Osobe koje pate od depresije su, kao što je već spomenuto, puno češće fizički neaktivne ili smanjeno aktivne, a s druge strane niske razine fizičke aktivnosti povećavaju rizik od depresije (18). Određene barijere poput sniženog raspoloženja, smanjene energije, kondicije i motivacije, ali i uzimanja antidepresiva koji za nuspojavu mogu imati vrtoglavicu, smanjuju mogućnost primjene fizičke aktivnosti u osoba koje boluju od depresije i time onemogućuju njen pozitivan učinak na mentalno zdravlje (19,20). Kao što je ranije navedeno, nije točno jasno koliki je intenzitet fizičke aktivnosti potreban kod osoba koje pate od depresije te postoji mogućnost kako je on i niži od standarda SZO-a s obzirom da te osobe većinom preferiraju aktivnosti niskog do srednjeg intenziteta (3). Čak do dvije trećine osoba koje pate od depresije se ne uklapaju u navedene standarde i preporuke SZO-a, a najviše preferirana fizička aktivnost je prema studijama upravo hodanje (18,20,21). Hodanje je aktivnost niskog intenziteta u kojoj si osoba sama može odrediti tempo (20). Stoga, takav oblik fizičke aktivnosti ne stvara pritisak da se mora

as "runner's high" or of a relaxed mental state sometimes experienced during intense exercise (17). Their effect is most pronounced after a few months of regular exercise, due to the increase in body sensitivity and the fact that they also remain in the bloodstream longer (17). Studies have also shown that exercise increases endorphin secretion, but it is not entirely clear whether this has a significant effect on mood. Such results can potentially be attributed to the fact that the measured plasma endorphin concentrations do not reliably correspond to the actual state in the central nervous system (16).

Based on the aforementioned physiological mechanisms that occur during physical activity, but also the pathophysiological basis of depression itself, it could be concluded that physical activity could potentially improve the condition and life quality of people suffering from depression. However, the relationship between physical activity and depression is bidirectional. People suffering from depression are, as already mentioned, much more often physically inactive or less active, and on the other hand low levels of physical activity increase the risk of depression (18). Certain barriers, such as low mood, decreased energy, fitness and motivation, but also taking antidepressants which can have dizziness as a side effect, reduce the capacity for physical activity in people suffering from depression and thus prevent its positive effect on mental health (19, 20). As mentioned earlier, it is unclear which level of intensity of physical activity is required in people suffering from depression, and it is possible that that the level is lower compared with the WHO's standards given that these people mostly prefer low- to medium-intensity activities (3). As many as two-thirds of people suffering from depression do not meet stated the WHO standards and recommendations, and the most preferred physical activity according to studies is actually walking (18, 20, 21). Walking is a low-intensity activity in which a person can set their own pace (20). Therefore, this form of

uklopiti u preporuke i standarde SZO-a, posebno ako nema sposobnosti dostići ih što bi moglo dodatno negativno utjecati na psihičko stanje. Čak bi i niske razine aktivnosti mogle djelovati protektivno i pozitivno na razvoj i tijek depresije (22). Također, prema istraživanjima je moguće da kod blage do umjereno teške depresije fizička aktivnost ima jednaku razinu pozitivnog utjecaja kao psihoterapija, posebno pokazano na primjeru trčanja kao oblika fizičke aktivnosti (23). Dakle, brojne studije su pokazale pozitivan učinak fizičke aktivnosti kod osoba koje pate od depresije ili su pod povećanim rizikom od njenog razvoja, samo je upitno u kojem obliku, intenzitetu i trajanju bi se ta aktivnost trebala provoditi (22,24-26). Prema rezultatima studija jednaka je korist provoditi aerobne vježbe u usporedbi s vježbama snage, jer je sama fizička aktivnost u smanjenju simptoma depresije važnija od razvoja kondicije vježbanjem visokog intenziteta (27,28). Također, čini se da je učinkovitije provoditi vježbanje u kontinuitetu (npr. 30 minuta/dan) nego intermitentno (npr. 3 x 10 minuta/dan s pauzom od 2 sata). Vježbanje srednjeg intenziteta u kontinuitetu osigurava bolju adherenciju i uspjeh u odnosu na nekoliko serija vježbanja visokog intenziteta s pauzama s obzirom da se osobe s psihičkim poremećajima češće priklanjaju aktivnostima nižeg do srednjeg intenziteta (29,30). U budućnosti preostaje sumirati rezultate raznih studija i donijeti jasne smjernice i preporuke za prevenciju, ali i moguću terapiju depresije.

FIZIČKA AKTIVNOST I ANKSIOZNOST

Pod terminom anksioznost smatra se širok spektar anksioznih poremećaja koji se u većini slučajeva dijele na akutne psihološke odgovore povezane s određenim događajem ili stimulansom te kronične dugotrajne poput generaliziranog anksioznog poremećaja

physical activity does not create the pressure of having to comply to the WHO's recommendations and standards, especially if a person does not have the ability to reach them, which could have an additional negative effect on the mental state. Even low levels of activity could have a protective and positive effect on the development and course of depression (22). Additionally, according to research, it is possible that physical activity has the same level of positive impact as psychotherapy in mild to moderate depression, especially as seen in the example of running as a form of physical activity (23). Thus, numerous studies have shown a positive effect of physical activity in people who suffer from depression or are at increased risk of developing it, with still outstanding questions regarding the form, intensity and duration in which the activity should be carried out (22, 24-26). According to study results, it is equally beneficial to perform aerobic exercises or strength exercises, because physical activity itself is more important in reducing the symptoms of depression than developing fitness by exercising with high intensity (27, 28). Furthermore, it seems to be more effective to exercise continuously (e.g. 30 minutes/ day) than intermittently (e.g. 3×10 minutes / day with a break of 2 h). Medium-intensity continuous exercise provides better adherence and success compared with several series of high-intensity exercise with breaks, considering that people with mental disorders are more likely to engage in low- to medium-intensity activities (29, 30). In the future, the results of various studies remain to be summarized, and clear guidelines and recommendations must be formed for prevention but also possible therapy for depression.

PHYSICAL ACTIVITY AND ANXIETY

The term "anxiety" includes a wide range of anxiety disorders that are in most cases divided into acute psychological responses associated with

(31). Anksiznost je stanje neugodnog straha i tjeskobe. Uključuje niz somatskih simptoma poput palpitacija, podrhtavanja ruku ili tijela, pojačanog znojenja, suhoće usta, dispneje/tahipneje, mučnine te napetosti mišića, ali i psihičkih simptoma poput slabosti, smanjene koncentracije, osjećaja nesvjestice te perzistirajuće zabrinutosti, ali i straha od gubitka kontrole nad vlastitim ponašanjem ili da će se dogoditi nešto neugodno. Učestalost generaliziranog anksioznog poremećaja je 3-5 % (32). U podlozi same anksioznosti može se kao i kod depresije naći poremećaj monoaminskog sustava, ali i smanjena razina GABA-e kao inhibitornog neurotransmitera te neurotrofnog čimbenika moždanog podrijetla (BDNF) što pridonosi razvoju atrofičnih strukturnih promjena u određenim kortikalnim regijama s naglaskom na one koje imaju ulogu u integraciji emocionalnih podražaja poput hipokampusa (33-35). Čini se da BDNF ima pozitivan utjecaj na preživljenje i rast neurona te njegova smanjena razina može biti patofiziološka podloga i za razvoj depresije (34,35). Osim već ranije opisanog pozitivnog učinka fizičke aktivnosti na monoaminski sustav, fizička aktivnost može dovesti i do povećanja razine određenih neuroregeneracijskih biljega poput spomenutog BDNF-a, ali i boljeg balansa između upalnih i protuupalnih te oksidativnih i antioksidativnih faktora s obzirom da se u podlozi anksioznosti može naći i povećana razina određenih upalnih faktora te povećan oksidativni stres (34,36,37).

Uzevši u obzir opisane patofiziološke mehanizme fizička aktivnost bi uvelike mogla imati pozitivan učinak na anksioznost, kao što bi i sedentarno ponašanje moglo imati negativan, što su pokazale i neke studije (38-40). Postoji mogućnost i da nisu uvijek fiziološki mehanizmi u pitanju, već i psihološki, pa se tako aktivnošću, prema hipotezi distrakcije, preusmjerava pažnja osobe sa stresnog stimulansa posljedično smanjujući razinu anksioznosti

a particular event or stimulus and into chronic long-term ones, such as generalized anxiety disorder (31). It is a state of uncomfortable fear and anxiety. It includes a number of somatic symptoms such as palpitations, trembling hands or body, increased sweating, dry mouth, dyspnea / tachypnea, nausea and muscle tension, but also psychological symptoms such as weakness, decreased concentration, the felling of dizziness and persistent concern, but also fear of losing control of one's own behavior or that something embarrassing will happen. The incidence of generalized anxiety disorder is 3-5% (32). The basis for anxiety disorders, as in the case of depression, can be found in the disfunction of the monoamine system, but also in reduced levels of GABA as an inhibitory neurotransmitter and brain-derived neurotrophic factor (BDNF), which contributes to the development of atrophic structural changes in certain cortical regions, with emphasis on those with a role in the integration of emotional stimuli such as the hippocampus (33-35). BDNF appears to have a positive effect on neuronal survival and growth, and reduced levels may be a pathophysiological basis for the development of depression (34, 35). In addition to the previously described positive effect of physical activity on the monoamine system, activity can also lead to an increase in the level of certain neuroregenerative markers, such as the abovementioned BDNF, and to a better balance between inflammatory and anti-inflammatory and oxidative and antioxidative factors, because the underlying basis for anxiety can corelate to increased levels of certain inflammatory factors and increased oxidative stress (34, 36, 37).

Given the described pathophysiological mechanisms, physical activity could have great a positive effect on anxiety, just as sedentary behavior could have a negative one, as studies have shown (38-40). There is a possibility that it is not always the physiological mechanisms that are in question, but also psychological ones, so activity, according to the distraction hypothe-

(16,38). Fizička aktivnost smanjuje rizik od simptoma anksioznosti, ali i od razvoja anksioznih poremećaja, posebno u usporedbi s osobama koje imaju vrlo niske razine fizičke aktivnosti (39). Djeluje anksiolitički i kod onih s anksioznim poremećajima i onih bez anksioznih poremećaja (19,41). Ipak, pitanje je djeluje li protektivno na sve anksiozne poremećaje ili specifično na neke poremećaje (39). Nerijetko se u pitanje dovodi učinak fizičke aktivnosti na panični poremećaj za koji se u većini studija smatra da ima protektivan učinak, ali ipak neke studije ukazuju na mogućnost da ga može pogoršati. Tome u prilog navode i činjenicu da brojni ljudi s paničnim poremećajem izbjegavaju provoditi posebno aerobne aktivnosti od straha da će biti *„trigger"* za panični napad. Taj strah proizlazi iz činjenice da fiziološka reakcija koja se razvije tijekom aerobnih aktivnosti poput povećanja pulsa i ventilacije te znojenja sliči manifestacijama paničnog napada. Stoga, iako se fizička aktivnost ne povezuje s razvojem paničnog napada, reakcije koje se tijekom njenog izvođenja dogode mogu se krivo interpretirati (42,43). Problematično je to što izbjegavanje aktivnosti vodi do općeg smanjenja kondicije što opet dovodi do slične fiziološke reakcije i na motoričke akcije minimalnog intenziteta stvarajući osobi još veći teret (42).

Kada je u pitanju oblik te intenzitet i trajanje fizičke aktivnosti, nema puno studija niti one daju jednake rezultate. U početku je većina studija uključivala samo aerobne aktivnosti, pa se moguće zbog toga u pojedinima pokazala veća korist takvog oblika fizičke aktivnosti (44). Međutim, prema novijim studijama otkrivena je podjednaka korist aerobnog vježbanja kao i vježbi snage (45,46). Podatci o intenzitetu su vrlo nekonzistentni jer neke studije preferiraju aktivnost niskog intenziteta poput hodanja ili džogiranja (40-50 % maksimalne srčane frekvencije), neke srednjeg (50-60 % maksimalne srčane

sis, redirects the attention of a person from a stress stimulus, consequently reducing the level of anxiety (16, 38). Physical activity reduces the risk of anxiety symptoms, but also of the development of anxiety disorders, especially compared with people who have very low levels of physical activity (39). It acts anxiolytically in both those with and without anxiety disorders (19, 41). However, the question is whether it has a protective effect on all anxiety disorders or specifically on particular disorders (39). The effect of physical activity on panic disorder, which is considered to have a protective effect based on most studies, is often questioned because of certain studies which suggest that physical activity may worsen it. This is supported by the fact that many people with panic disorder avoid performing aerobic activities in particular because of the fear of them being a "trigger" for a panic attack. This fear stems from the fact that the physiological response that develops during aerobic activities such as increased heart rate, ventilation and sweating is similar to the manifestations of a panic attack. Therefore, although physical activity is not associated with the development of a panic attack, the reactions that occur during its performance may be misinterpreted (42, 43). The problem is that avoiding activity leads to a general decrease in physical fitness, which in turn leads to a similar physiological reaction to motor actions of even minimal intensity, creating an even greater burden on the person (42).

Regarding the intensity and monitoring of physical activity, there are not many studies about the topic, and the ones that provide some statistics about it are not uniform in the results. Initially, most studies included only aerobic activities, so it is possible that that is the reason why some of them showed greater benefit of that form of physical activity (44). However, according to new studies, it has been found that the benefits of aerobic exercise are equal to the benefits of strength exercises (45, 46). Intensity data are very inconsistent due to the fact that

frekvencije), a neke čak visokog intenziteta (70-75 % maksimalne srčane frekvencije) (47). S obzirom da ti podatci nisu usuglašeni, najbolja je opcija prilagoditi razinu intenziteta pojedincu u konzultaciji sa zdravstvenim radnikom. Oni ciljevi koje osoba donese sama imaju veću vjerojatnost adherencije (45). Na kraju, čini se, najveći i konzistentan utjecaj na smanjenje anksioznosti ima trajanje fizičke aktivnosti, iako se po točnim brojkama studije razlikuju. Prema nekima se najučinkovitijom aktivnošću smatra ona s trajanjem od barem 21 minute, a prema nekima od barem 30 minuta, iako bi čak i fizička aktivnost od 5 minuta mogla uzrokovati anksiolitički efekt (38,47,48). Važnije od duljine pojedine serije fizičke aktivnosti je razdoblje tijekom kojeg se ona dugoročno provodila. Prema nekima se najboljim učinkom na anksioznost smatra provođenje tijekom 10-15 tjedana ili čak duže uz smanjenu učinkovitost u trajanju manjem od 9 tjedana, a prema nekima je najučinkovitije razdoblje od 3 do 12 tjedana uz smanjenje nakon toga moguće zbog smanjenja adherencije (38,48).

FIZIČKA AKTIVNOST I PSIHOZA

Pod ovim terminom opisivat ćemo shizofreniju kao u istraživanjima najšire prikazanu psihozu u povezanosti s fizičkom aktivnošću. Karakteristike ovog psihičkog poremećaja uključuju pozitivne (halucinacije, sumanute ideje, poremećaji mišljenja) i negativne (smanjena motivacija, pasivizacija, poteškoće u izražavanju emocija, siromaštvo komunikacije) simptome te kognitivne simptome (poremećaj pažnje, pamćenja). Pojavnost u populaciji kreće se od 2,5 do 3,5/1000 stanovnika (32). Točna etiologija je i dalje nepoznata, ali postoje brojni čimbenici koji utječu na njen razvoj: od genetike do promjena u središnjem živčanom sustavu. Te promjene podrazumijevaju poremećaj serotonina, dopamina, noradrenalina, GABA-e, ali i

some studies prefer low intensity activity such as walking or jogging (40-50% of maximum heart rate), while other examined medium (50-60% of maximum heart rate) and high intensities (70-75% of maximum heart rate) (47). Since these data are not consistent, the best option was to adjust the different levels of intensity to a person's preferences in consultation with the healthcare professional. The goals that a person sets himself have a higher probability of adherence (45). Finally, the duration of physical activity appears to have the greatest and the most consistent impact on reducing anxiety, although numbers differ in some studies. According to some, physical activity is most effective when it lasts at least 21 minutes, or least 30 minutes according to others, although even 5 minutes of physical activity could have an anxiolytic effect (38, 47, 48). More important than the duration of an individual series of physical activity is the period in which it is conducted in the long run. According to some studies, the best effect on reducing anxiety is exercise that lasts for 10-15 weeks or even longer, with reduced efficiency for durations of 9 weeks or less, while according to others, the most effective period is 3 to 12 weeks, after which it has a lesser effect, probably due to reduced adherence (38, 48).

PHYSICAL ACTIVITY AND PSYCHOSIS

Under this term, we will discuss schizophrenia since it is the most widely presented psychosis in association with physical activity in previously conducted studies. Characteristics of this mental disorder include positive (hallucinations, bizarre delusions, disruptions of thoughts) and negative (decreased motivation, passivation, difficulty in expressing emotions, poverty of communication) symptoms as well as cognitive symptoms (e.g. attention and memory disorder). The incidence in the population ranges from 2.5-3.5 / 1000 people (32). The exact eti-

ranije spomenutog BDNF-a koji ima veliku ulogu u hipokampalnoj regiji, a u ovom poremećaju je kao i kod anksioznosti snižen (49,50). Osim manjka BDNF-a hipokampalna regija, važna za učenje i pamćenje, kod shizofrenije je moguće smanjena s posljedičnim poremećajem neuroplastičnosti (51). S obzirom da se antipsihoticima može djelovati samo na hormonske poremećaje, a ne i na ovaj zadnje opisani dio, pozitivan učinak bi mogla imati fizička aktivnost koja, kao što je ranije spomenuto, povisuje razinu BDNF-a (50,52). Nije poznato kojim bi još mehanizmima fizička aktivnost mogla djelovati, ali studijama je pokazano kako ima pozitivan učinak i na pozitivne i negativne simptome, kogniciju s naglaskom na socijalnu kogniciju, kvalitetu života te svakodnevno funkcioniranje (50,53,54). Nažalost, gotovo se polovica osoba koje boluju od shizofrenije ne uklapa u preporuke izvođenja fizičke aktivnosti SZO-a uz slične barijere kao u dosad navedenim poremećajima – smanjena kondicija, primjena antipsihotika ili antidepresiva s posljedičnom pojavom vrtoglavice, itd. Zanimljiv nalaz je da se usporedbom rezultata upitnika koje osobe samostalno ispunjavaju i rezultata kliničkih analiza uvidjelo kako imaju krivo viđenje i procjenu količine vremena koju provode u sedentarnom ponašanju (niže vrijednosti u odnosu na realan rezultat) odnosno izvodeći fizičku aktivnost (više vrijednosti u odnosu na realan rezultat) (19). Moguće je da je to posljedica kognitivnih poremećaja, ali i da zbog te krive procjene osobe ne izvode veće količine fizičke aktivnosti jer imaju percepciju kao da je već izvode dovoljno.

Kada su u pitanju karakteristike fizičke aktivnosti koja bi se trebala provoditi, većinom se stavlja naglasak na aerobnu aktivnost, dok ostali oblici nisu istraženi u većem obujmu. Aerobna aktivnost je povezana s pozitivnim učinkom na sve ranije navedene simptome shizofrenije, ali posebno na negativne simptome, simptome depresije i anksioznosti (54,55). Prema studiji iz

ology is still unknown, but there are various factors that influence its development, from genetics to changes in the central nervous system. These changes include a disorder in serotonin, dopamine, norepinephrine and GABA levels, but also in the previously mentioned BDNF that plays a major role in the hippocampal region and is reduced, as in anxiety (49, 50). Additionally, the hippocampal region, which is important for learning and memory, may be reduced in schizophrenia, with a consequent decrease in neuroplasticity (51). Since antipsychotics can only act on hormonal disorders and not on BDNF, physical activity could have a positive effect because it, as mentioned earlier, raises BDNF levels (50, 52). It is not known by which other mechanisms physical activity could act, but studies have shown that it has a positive effect on both positive and negative symptoms, on cognition with an emphasis on social cognition, on quality of life and on daily functioning (50, 53, 54). Unfortunately, almost half of people with schizophrenia do not fit the WHO's recommendations for physical activity because of the barriers similar to those in the previously described mental disorders – reduced fitness, use of antipsychotics or antidepressants with consequent dizziness, etc. An interesting finding is that comparison of self-report questionnaires results and clinical analyses results showed patents they have a distorted view and assessment of the amount of time they spend in sedentary behavior (lower values compared with the actual result) or performing physical activity (higher values compared with the actual result) (19). It is possible that this is a consequence of cognitive disorders, but it may also be the case that the incorrect assessment leads to performing lower amounts of physical activity because of the perception that they are already performing enough.

Regarding the characteristics of physical activity that should be performed, emphasis has been placed on aerobic activity, while other forms have not been explored to a greater ex-

2014. g. provedenoj na pacijentima koji boluju od shizofrenije ili shizoafektivnog poremećaja, aerobna aktivnost srednjeg intenziteta u obliku hodanja na pokretnoj traci ili vožnje sobnog bicikla u trajanju od 30 do 40 min. 3 puta/tjedan 10–16 tjedana, pokazala je pozitivan učinak na ublažavanje simptoma (56).

ZAKLJUČAK

Ovim prikazom međuodnosa mentalnog zdravlja s naglaskom na pojedine psihičke poremećaje i fizičke aktivnosti može se zaključiti kako fizička aktivnost u tom kontekstu ima vrlo veliku i važnu ulogu. S razlogom postoje preporuke SZO-e za provođenje fizičke aktivnosti u bilo kojem obliku s obzirom na njene multiple pozitivne učinke poput regulacije razine hormona i neuroregenerativnih biljega u središnjem živčanom sustavu, regulacije odnosa upalnih/protuupalnih te oksidativnih/antioksidativnih faktora, ali i na psihološkoj razini distrakcije od raznih vanjskih stresnih stimulansa. U takvom obliku fizička aktivnost može služiti kao prevencija za razvoj psihičkih poremećaja te poboljšanje općeg mentalnog zdravlja, ali i kao terapija psihičkih poremećaja. Ako bi ikada postojala mogućnost, preporuke primjene fizičke aktivnosti za prevenciju/liječenje psihičkih poremećaja i unaprjeđenje mentalnog zdravlja bilo bi poželjno unificirati i detaljnije opisati točnim oblikom aktivnosti, intenzitetom i trajanjem. Vježbanje srednjeg intenziteta u kontinuitetu osigurava bolju adherenciju i uspjeh prema studijama za depresiju, dok bi za anksiozne poremećaje najučinkovitija aktivnost bila ona s trajanjem od barem pola sata u rasponu trajanja od 10 do 15 tjedana. Dok za depresiju i anksioznost jednaki učinak ima aerobni način vježbanja kao i vježbe snaga, za psihoze se preporuča aerobna aktivnost srednjeg intenziteta u razdoblju od 10 do 16 tjedana do poboljšanja simptoma. Zaključno, pri propisivanju tjelesne aktivnosti s ciljem poboljšanja zdravlja posebtent. Aerobic activity is associated with a positive effect on all of the previously mentioned symptoms of schizophrenia, but especially on the negative symptoms and symptoms of depression and anxiety (54, 55). According to a 2014 study conducted on patients with schizophrenia or schizoaffective disorder, medium-intensity aerobic activity in the form of walking on a treadmill or riding a stationary bike for 30-40 min, ×3 / week for 10-16 weeks has shown a positive effect on relieving symptoms (56).

CONCLUSION

Based on this review of the association between mental health, with an emphasis on a few individual mental disorders, and physical activity, it can be concluded that physical activity plays a very large and important role in this context. The WHO's recommendations for physical activity obviously exist with good reason, considering its multiple positive effects such as regulation of hormone levels and neuroregenerative markers in the central nervous system, regulation of inflammatory / anti-inflammatory and oxidative / antioxidative factors, but also by causing a distraction from various external stress stimuli on the psychological level. Consequently, physical activity can serve as prevention for the development of mental disorders and improvement of mental health in general, but also as a therapy for mental disorders. Should it ever be possible, it would be beneficial to unify recommendations for the use of physical activity in the prevention or treatment of mental disorders and improvement of mental health by describing in more detail the exact form of activity, its intensity and duration. Medium-intensity exercise in continuity ensures better adherence and success according to studies for depression, while the most effective activity for anxiety disorders would be the one lasting at least half an hour daily for 10-15 weeks. While the aerobic mode

nu je pozornost potrebno obratiti da oblik, intenzitet i trajanje tjelesne aktivnosti budu prilagođeni dobi i zdravstvenom statusu osobe koja sudjeluje u tjelesnoj aktivnosti, odnosno osobnim tjelesnim komorbiditetima.

of exercise has the same effect as strength exercises for depression and anxiety, aerobic activity of medium intensity over a period of 10-16 weeks is recommended for psychosis until the symptoms improve. In conclusion, when recommending physical activity with the aim of improving health, special attention should be paid to ensure that the form, intensity and duration of physical activity is age-appropriate and also appropriate to the health status of the person participating in physical activity.

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