

THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND POLYPHARMACY WITH *IKIGAI* IN A POPULATION

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Abstract

The aim: The Japanese word «ikigai» indicates «something to live for» and «having a purpose in life». Ikigai or well-being, has been associated with many positive outcomes in the physical and mental health of elderly people. In this study, the relationship between ikigai and level of physical activity and polypharmacy was examined in a Turkish population.

Material and methods: Both telephonic interviews and face-to-face interviews were conducted with 307 participants (59.2 % women) who completed the Ikigai-9 Turkey Scale and provided demographic information.

Results: Correlations between groups (polypharmacy vs. non-polypharmacy) were analyzed with an independent t-test and analysis of variance. The means of the ikigai scores were statistically significant in the polypharmacy (24.04 ± 8.72) and non-polypharmacy (32.64 ± 7.53) groups ($p < 0.05$). The number of drugs used was negatively correlated with duration of exercise per week (1.32 ± 1.82 , correlation coefficient = 0.538, $p < 0.05$).

Conclusions: The level of ikigai was negatively correlated with polypharmacy and positively correlated with duration of physical activity. An individual's ikigai should be assessed by healthcare providers to maximize positive outcomes later in life.

Keywords: aged, polypharmacy, exercise, humans, mental health, Japan, female, demography.

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1. Introduction

We use the Japanese word «ikigai» to indicate «something to live for», and one of the most fundamental human needs is having a purpose in life. *Ikigai*, namely, a sense that life is worth living is one such common psychological factor that first became popular in Japan. While hedonic wellbeing primarily focuses on pleasure, eudaimonic wellbeing focuses on life's meaning and purpose, and both of them are rooted in Aristotle's ethics [1]. Kamiya (1966), one of the earliest *ikigai* scientists, proposed a theory that individuals would first need to satisfy the psychological needs such as life satisfaction, hopeful future, psychological resonance so that they could move toward a perception of life as worth living [2]. However, Kumano (2012) agreed mostly with the idea based on empirical studies that human beings perceive worthiness to live from negative and positive lifetime experiences [3]. He revealed the positive relationship of the four-factor *ikigai* perception (life affirmation, meaning in life, life fulfilment, and existential value) with five mechanisms (making

sense of the past, setting future goals, being absorbed into the positive present, accepting negative situations, and coping with negative situations) [3, 4]. Psychological factors have a significant impact on morbidity and mortality [5–7]. *Ikigai* has been associated with the risk of mortality [8, 9]. It is recommended that *ikigai* be implemented in healthcare policies to enable older people to realize a more fulfilling life [10].

Although polypharmacy (PFC) has been defined in various ways, in this study, it is defined as a condition in which an individual uses more than five drugs [11, 12]. Geriatric patients may have multiple diseases, which may lead to the complexity of therapeutic management. Accordingly, prescribing drugs, which is associated with negative health outcomes, may increase [13]. A single patient's use of multiple drugs for one or more conditions leads to drug-drug interactions and a lower adaptation to medications [14]. The Kessler Psychological Distress Scale has been employed to measure psychological distress. The items of the scale assess respondents' anxiety and depression. Assari and Bazargan (2019) revealed that African-American adults who used multiple medications suffered higher psychological distress than those who did not [15]. However, there is a scarcity of data on the link between PFC and psychological wellbeing [16]. Although the factors associated with PFC have been revealed in various global epidemiological studies, the association between PFC and *ikigai* has yet to be examined in a Turkish population [17, 18].

Both behavioural factors such as physical inactivity, smoking, and sitting as well as psychological factors including loneliness, hopelessness, and low subjective wellbeing have been associated with an increased risk of mortality [19–21]. Research has revealed that individuals' healthy practices support their capacity for favourable social roles and positive psychological profiles [10, 21, 22]. Shibata (1998) proposed that *ikigai* is an element of the structural concept of the elderly's quality of life (QOL) [23]. Demura et al. (2005) demonstrated that *ikigai* is imperative to comprehend the elderly's QOL (24). Studies have also found that the effect of mental QOL on *ikigai* was more marked in subjects who did not exercise habitually than those who did [23–25]. The purpose of this study was to compare *ikigai*, a positive psychological factor, with other parameters including exercise and polypharmacy. This study is the first to reveal a relationship between the duration of physical activity and the number of medications with the total scores on a psychometric *ikigai* measure (Ikigai-9 Turkey Scale) in a Turkish population.

The aim of presented study is to determine the association of different level of *ikigai* with physical activity and polypharmacy.

2. Materials and methods

The participants were selected randomly in a population over 18 years old with both telephonic interviews and face-to-face interviews and then their data was saved in papers.

Statistics: G-power (ver. 3.1.9.4) was employed to determine the sample size with a 5 % type-1 error and 85 % test power. Random sampling in public places including a cafe, park, and hospital garden was employed to select the 307 participants that comprised 182 (59.2 %) women and 125 (40.8 %) men. An independent t-test and one-way analysis of variance were employed to compare the variables. SPSS (IBM SPSS for Windows, ver. 24) was used to analyze the data, which were saved in excel files.

Inclusion criteria: participants had to be 18 years of age or older and have the ability to understand and answer all the items in the scale.

Exclusion criteria: those who did not meet the inclusion criteria or suffered mental illnesses such as schizophrenia or mental retardation were excluded.

Procedure: while a research assistant conducted telephonic interviews with 97 participants, face-to-face interviews were conducted with the other 210 participants. The same survey form was employed to conduct both types of interviews.

Questionnaires:

Ikigai-9 UK and Ikigai-9 Turkey Scale: A separate study was conducted between 1 November and 31 December 2019 to determine the validity and reliability of Ikigai-9 Turkey. Subsequently, the Ikigai-9 Turkey Scale was administered to the participants of this study from 1 February to 31 March 2020 (25). The items of the scale are presented in **Table 1**.

Table 1
Ikigai-9 Turkey and UK Scale Items

1	Çoğu zaman kendimi mutlu hissedirim. <i>I often feel that I am happy</i>
2	Yeni bir şeyler öğrenmek veya yeni birşeylere başlamak isterim. <i>I would like to learn something new or start something</i>
3	Birine veya topluma bir katkı olduğumu düşüncesindeyim. <i>I feel that I am contributing to someone or society</i>
4	Kalbimde herkese bir yer vardır ve farklı düşüncelere açığım. <i>I have room in my mind</i>
5	Hayatta hemen hemen birçok şeyle ilgilenirim. <i>I am interested in many things</i>
6	Varlığımın biri veya bir şeylerin ihtiyaç duyduğuna inanıyorum. <i>I think that my existence is needed by something or someone</i>
7	Hayatı yeterince tatmin edici ve dolu buluyorum. <i>My life is mentally rich and fulfilled</i>
8	Kendimi geliştirmek istiyorum. <i>I would like to develop myself</i>
9	Başkaları üzerinde bir etkim olduğumu düşünüyorum. <i>I believe that I have some impact on someone</i>

Demographic form: the participants were required to provide the following: age, gender, duration of exercise per week, and number of drugs used regularly. The participants that used five or more drugs constituted the PFC group. The significance level was set to $p < 0.05$.

Ethical approval: the study was approved by the Antalya Akdeniz University Ethics Committee (Decision No: KAEK-319, date: 13.05.2020). Furthermore, all the participants provided informed written consent.

3. Results

The *ikigai* score in the non-PFC ($n = 283$) and PFC ($n = 24$) groups was 32.64 ± 7.53 and 24.04 ± 8.72 , respectively. These group differences were statistically significant (t-test, Hedges'g = 113.556094, correlation coefficient = 0.543, $p = 0.034$, % 95CI = 5.43–11.77). The non-PFC and PFC groups spent an average of 100.92 ± 125.20 min and 30.42 ± 57.82 min exercising a week, respectively. Furthermore, there was a statistically significant negative correlation between the number of drugs used and duration of exercise per week (Pearson correlation coefficient: -0.141 , $p = 0.013$). Pearson correlation coefficient revealed a significant association between *ikigai* and PPC ($r = 0.36$, $p < 0.001$) and between *ikigai* and physical activity ($r = 0.21$, $p < 0.001$). Fifty (16.2 %) of the participants were older than 50 years. Furthermore, the level of *ikigai* and exercise decreased significantly ($p < 0.05$) as the participants aged. Women and men spent an average of 83.2 ± 113.39 min and 111.6 ± 132.56 min exercising, respectively regardless of intensity and type of exercise (t-test, Hedges'g = 0.024487, correlation coefficient = 0.114, $p = 0.046$, % 95CI = 1.985–57.772). The mean of the *Ikigai* score in those under 65 and over 65 years was 33.2 ± 7.47 and 25.1 ± 8.19 , respectively (Pearson correlation = -0.299 , t-test, $p = 0.000$). A backward regression model was employed to determine the factors affecting the participants' *ikigai*. It was revealed that age, physical activity, and PPC significantly influenced their *ikigai* ($p \leq 0.05$).

4. Discussion

Elderly people do not attend fitness gyms in Okinawa, a Bluezone point. However, they practice tai-chi, which is a form of yoga, gardening, and other activities in the open. This has a positive effect on their stress levels and allows them to feel like active members of the community [26]. *Ikigai* is prominent in Bluezone points. In these areas, individuals have a positive attitude toward life and extremely low levels of stress [27]. The research has revealed that positive psycho-

logical characteristics affect individuals' health and longevity [28, 29]. *Ikigai* is another positive psychological feature that interacts with other health domains in life including nutrition, physical activity, and social interaction [30, 31]. Diener and Chan (2011) found that the daily living activities of residents aged 65 and older were positively correlated with having hobbies and a purpose in life, that is, *ikigai* [32]. Eight hours sleep a night, a vegan-based diet, physical activity, and not smoking are well-known healthy behaviours [33]. Park et al. (2016) noted that it is inconclusive how many of healthy behaviours can be changed by positive psychology interventions [34]. Furthermore, it is unclear whether positive psychology interventions including training in mindfulness meditation, inducing positive emotions, and psychosocial resilience training can shape a range of healthy behaviours [35, 36]. The results of this study revealed a statistically significant positive correlation between physical activity and *ikigai*. Consequently, the longer the time the participants spent on exercise, the more their positive psychology, *ikigai*, increased. Demura et al. emphasized that mental QOL does not have a significant influence on *ikigai* if individuals exercise regularly [24].

PFC has been found to be associated with falls, increased mortality, adverse drug use, cognitive decline, and poor QOL [37, 38]. Wongpakaran et al. (2018) revealed an association between anxiety disorder and depressive disorder with higher medication use among older adults [39]. Furthermore, Hajjar et al. (2007) revealed that anxiety disorder was related to PFC more than depressive disorder [40]. Many studies have demonstrated the relationship between depression and PFC and some research has revealed that it is a more salient predictor than other diseases [41, 42]. The present study also found that *ikigai* was negatively correlated with PFC in both elderly and younger people. Although the effect of *ikigai* as a preventive positive psychological factor on mortality remains unclear, there are several possible explanations. First, *ikigai* may be associated with modifiable behaviours such as exercise. As revealed in this study, the level of *ikigai* increases as individuals exercise more. Second, lower scores of *ikigai* may be associated with multiple medications, which are indicative of more diseases specifically in older adults. Third, positive psychological factors such as *ikigai* may be directly associated with the severity of stress in an individual's life. Many studies have revealed that excessive stress can change neuroendocrine or immune responses negatively [43, 44].

In essence, *ikigai* was negatively associated with PFC and positively associated with physical activity. The results have shed light on the relationship between *ikigai*, PFC, and physical activity. We hope that the findings in this study will lead to future research to reveal the medications that have an effect on *ikigai* and what modifications on the preference of drugs could be appropriate for the level of *ikigai* and duration of exercise. Our study is the first to examine these associations in a Turkish sample. It has shed light on how PPC and exercise play a vital role on an individual's positive psychology.

Study limitations. The present study has various limitations. First, we did not acquire information on the prevalence of mental illnesses such as anxiety or depression. Second, the type and intensity of exercise in which the participants engaged were not determined.

Prospects for further research. The presented study gives an idea how a parameter of positive psychology like *ikigai* could lead positive outcomes on health. Healthcare providers can increase the level of *ikigai* by some interventions in their daily practices. Implementations for having a higher *ikigai* in a geriatric person by for could lead a successful aging process, as well.

5. Conclusions

The level of *ikigai* should increase as a function of physical activity. The identification of individual specific factors related to *ikigai* among individuals, especially elderly individuals, may be of value to enhance positive outcomes in general health. The multidimensional sides of positive psychology in aging studies should be revealed to enjoy successful aging in future research to enjoy enhanced health outcomes that could be supported by interventions including exercise, modification of medications, and/or nutrition.

Conflict of interest

The authors declare that there is no conflict of interest.

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