Original article / *Araştırma*

Levels of depression, anxiety and quality-of-life of kidney and liver donors in a university hospital in Ankara

Arda KARAGÖL[1]

ABSTRACT

Objective: *The psychosocial assessments of live kidney and liver donor candidates constitutes an important issue whereas many studies has drawn attention to the donation's correlation with anxiety and depression as well as the unwanted psychosocial outcomes. There are studies that find psychiatric disorders that appear in the post-operative period after donation lower or higher compared to the normal population. Altruism is considered as a concept that ensures vital stress management and is defined as 'the degree of obligation felt in situations where you are supposed to help others'. It is believed that altruistic behavior is a mature defense mechanism, which prevents the development of psychiatric disorders such as anxiety disorder and depression and protects the individual against those psychiatric disorders.* ***Methods:*** *Our study included 51 participants who were donors of kidney and liver at Ankara Hospital of Başkent University between the years 2016 and 2017, and who accepted to participate in the study. The participants were given the Beck Depression Inventory, Beck Anxiety Inventory, SF-36 Quality-of-Life Scale and a Sociodemographic Questionnaire.* ***Results:*** *When the donors who participated in the study were compared with the Turkish society standards, the patient group was found to obtain significantly higher scores than the society average in the quality-of-life subscales 'physical function', 'difficulty in physical role', 'mental health' and 'pain', therefore, they were found to have a higher quality-of-life. Among the donors who participated in our study, the rate of those with moderate to severe depression was found to be 3.9% and of those with moderate to severe anxiety was found to be 'zero'.* ***Discussion:*** *Organ donation may be an altruistic behavior acting as a defensive mechanism that protects the individual against mental disorders such as depression and anxiety and increasing the quality-of-life.* ***(Anatolian Journal of Psychiatry 2019; 20(2):175-181)***

Keywords: *donorship, anxiety, depression, quality-of-life, altruism*

Ankara'da bir üniversite hastanesinde böbrek ve karaciğer vericilerinde depresyon, anksiyete ve yaşam kalitesi düzeyleri

ÖZ

Amaç: *Canlı böbrek ve karaciğer verici adaylarının ruhsal-toplumsal değerlendirilmeleri önemli bir konudur ve çeşitli araştırmalarda vericiliğin; anksiyete ve depresyonla, istenmeyen ruhsal-toplumsal sonuçlarla olan bağlantılarına dikkat çekilmiştir. Vericilik sonrası postoperatif dönemde psikiyatrik bozuklukları normal popülasyondan daha düşük veya daha yüksek bulan araştırmalar vardır. Altruizm, yaşamsal stres yönetimini sağlayan ve 'başkalarına yardım edilmesi gereken durumlarda kendini zorunlu hissetme derecesi' olarak tanımlanmıştır. Altruistik davranışın kişiyi depresyon, anksiyete bozuklukları gibi psikiyatrik bozukluklardan koruyan olgun bir savunma düzeneği olduğu düşünülmektedir.* ***Yöntem:*** *Çalışmamıza 2016-2017 yıllarında Başkent Üniversitesi Ankara Hastanesi'nde böbrek veya karaciğer vericisi olmuş, çalışmaya katılmayı kabul eden 51 kişi alınmıştır. Katılımcılara Beck Depresyon Ölçeği, Beck Anksiyete Ölçeği, SF-36 Yaşam Kalitesi Ölçeği ve Sosyodemografik Anket Formu verilmiştir.* ***Bulgular:***

[1] Assist. Prof. Dr., Başkent University, Department of Psychiatry, Ankara, Turkey
Correspondence address / *Yazışma adresi:*
Assist. Prof. Dr. Arda KARAGÖL, Baskent University Hospital, Department of Psychiatry, Mareşal Fevzi Çakmak Caddesi, 10. Sokak, No.45, 06490 Yukarı Bahçelievler/Ankara, Turkey
E-mail: ardakaragol@yahoo.com
Received: July, 04th 2018, Accepted: September, 21st 2018, doi: 10.5455/apd.302642811

Araştırmaya katılan organ vericileriyle Türk toplumu standartları karşılaştırıldığında, hasta grubunun yaşam kalitesi alt ölçeklerinden fiziksel işlev, fiziksel rol güçlüğü, ruhsal sağlık ve ağrı alt ölçeklerinde toplum ortalamasına göre anlamlı olarak daha yüksek puanlara sahip oldukları bulunmuştur. Araştırmamıza katılan organ vericilerinde orta-ağır depresyonu olanların oranı %3.9, orta-ağır düzeyde anksiyetesi olanların oranı 'sıfır' olarak bulunmuştur. ***Tartışma:*** *Organ vericiliği, kişiyi depresyon ve anksiyete gibi ruhsal bozukluklara karşı koruyan, yaşam kalitesini yükselten olgun bir savunma düzeneği olarak etki eden altruistik bir davranış olabilir.* ***(Anadolu Psikiyatri Derg 2019; 20(2):175-181)***

Anahtar sözcükler: *Karaciğer vericiliği, böbrek vericiliği, anksiyete, depresyon, yaşam kalitesi, altruizm*

INTRODUCTION

Live donors constitute a unique patient group, who are exposed to major surgical intervention, even though they are healthy, just to ensure that another individual will recover his/her health. The psychosocial assessments of live kidney and liver donor candidates is an important issue researched by various authors, and those researches has drawn attention to the donation's correlation with the presence of anxiety and depressive symptoms, undesired psychosocial consequences as well as both its medical outcomes and the psychological, cultural and demographic issues. Keeping those undesired outcomes to a minimum can be ensured through a careful selection and follow-up.[1] Donors who have an altruistic motivation, feel no ambivalence, have an understanding on the risks of donation, have no history of psychiatric disorders, receive a good family support and have no economic problems show better outcomes in psychiatric terms, and experience fewer psychiatric disorders in the postoperative period.[2] Among the various reasons for preferring live organ donation, the most important ones are the low risk rate for the donor, the low risk/benefit ratio, such psychological benefits as altruism and autonomy for the donor and the high donor satisfaction.[3] In a compilation where 51 researches were reviewed, 5139 kidney donors were assessed in the post-operative 4-year period, and it was found that those donors gained psychological benefits through their increased self-esteem and happiness for helping an individual who needs help by donation.[4] Post-donation depression tends to develop in the late period after the operation. In a five-year follow-up, the cumulative depression frequency was found to be 4.2% in one year and 11.5% in five years. Whereas the donors, who are not a relative of the patient, had the highest risk of developing depression, the rejection of the given organ or the death of the recipient may also play a role in the development of depression.[3] The incipient psychiatric disorders after live liver donation are found to develop in 4% of donors where depression, anxiety disorders were the most common disorders, followed by drug use disorder and conversion disorder.[5] Having no partner, young age, lack of social support and using timid coping strategies were found to be associated with a higher psychological stress after donation.[6] Moreover, certain researches showed that female donors and those whose postoperative process is more complicated have a greater risk of developing psychiatric symptoms, and that those individuals need to receive an adequate care and support.[7] Whereas the perioperative psychiatric disorders in live donors were reported to be up to 14%, anxiety and depression come to the forefront among these disorders.[8] Live organ donors make a self-sacrifice, just for the sake of another individual, by accepting a surgical operation and giving part or all of their organs. Most of the studies aim to make future operations more perfect by trying to evaluate the factors that cause worse psychiatric outcomes in donors and training the clinicians who perform psychosocial assessments.[9] Another study on the quality-of-life in the live donors showed that, although the depression and anxiety levels in live donors were found to be at a level comparable with those in the age and gender-matched control groups, increasing stressors, aggravated recovery process and the donation-related ambivalence increased the frequency of psychiatric disorders.[10] Organ donation was found to be correlated with a moderate increase in self-esteem and psychological development.

Altruism

Numerous studies have shown that the positive behaviors, including altruism, may have beneficial effects on health in people who exhibit these behaviors. Altruism is considered as a concept that ensures vital stress management and is defined as 'the degree of obligation felt in situations where you are supposed to help others'. It was found to be correlated with primarily the 'familial' obligations, and then the 'citizenship' obligations and the contribution to the 'others'.[11] Schwartz and Sendor showed that altruistic (self-sacrificing) patients experience a better quality-of-life.

[12] Schwartz et al. found that there is a positive and significant relationship between altruistic behavior and mental health.[13] Brown in one of his studies also reached the same conclusion.[14] Altruistic behavior leads to the formation of positive emotions. Fujiwara reported that altruistic behaviors were protective against the generalized anxiety disorder.[15] It is believed that altruistic behavior prevents the development of psychiatric disorders such as anxiety disorder and depression and protects the individual against those psychiatric disorders.

Quality-of-life in donors

The definition of quality-of-life proposed by the Centers for Disease Control (CDC) embraces specific measurable concepts such as mental well-being, physical functioning and holistic health status, and those are affected many factors such as marriage or job.[16] The A2ALL study, conducted simultaneously in nine centers, where live liver donors were followed up to 11 years in post-operative period and SF-36 was used, showed that found that the mental health of donors was better than that of the normal population.[17] This outcome is also supported by some researchers.[18] Whilst the short- and long-term mortality and morbidity of the live liver donation has been clearly revealed in medical aspects, the effect of donation on health-related quality-of-life has not yet been clarified.[19] The health-related quality-of-life is a multi-dimensional concept, and includes the physical, emotional and social well-being of the individual.[17]

Depression and anxiety disorders

In 2015, WHO identified the depression as the 'primary' disease (7.5%) in the whole world, that cause most loss of power in an individual's life.[20] According to the WHO's 2015 data, 3.26 million (4.4%) of the population suffer from depression in Turkey. According to the WHO's 2015 data, about 3 million (4%) of the population suffer from anxiety disorders in Turkey.[21] Accordingly, both psychiatric disorders contribute greatly to the unhealthy lived years in an individual's life in Turkey and in the world and come to the forefront in this regard.

METHODS

Participants

The study population included 51 organ donors, including 36 kidney donors and 15 liver donors, who underwent a surgery as liver or kidney donors in the Başkent University Ankara Hospital from 2016 to 2017. Among the liver donors included in the patient group, 26 in total who did not want to participate in the study cannot be reached or whose age did not match the research criteria, were excluded from the study. Among the kidney donors included in the patient group, 45 in total who did not want to participate in the study, cannot be reached or whose age did not match the research criteria, were excluded from the study. Those who accepted to be interviewed were interviewed face-to-face whilst those who were unable to attend the interview were interviewed by phone. Başkent University Clinical Investigation Ethics Committee approved this study.

Study inclusion criteria

For inclusion in the patient group:
1. being between the ages of 18 and 65,
2. having undergone a surgery as liver or kidney donor in Başkent University Ankara Hospital from 2016 to 2017,
3. accepting, of his/her own free will, to participate in the study.

Scales used

Sociodemographic Questionnaire: It is a questionnaire consisting of 23 items.

Beck Depression Inventory (BDI): It was developed by Beck et al. and consists of 21 items. Each item scores between 0 and 3. The increase in total score shows how high the level or severity of depression is.[22] The Turkish validity and reliability study of the scale was performed by Hisli.[23]

SF-36 Quality-of-Life Scale: It was developed by Ware and Sherbourne and consists of 36 items.[24] The scale evaluates the quality-of-life, especially in individuals with physical disorders. For each subscale, a score of '100 points' indicates good health and a score of '0 point' indicates poor health state. The Turkish validity and reliability study of the scale was performed by Kocyigit.[25]

Beck Anxiety Inventory (BAI): It was developed by Beck et al. and is used to determine the frequency of anxiety symptoms.[26] The highest score that one can obtain from the scale is 63. A high total score indicates a high level and severity of anxiety. Ulusoy et al. performed the Turkish validity and reliability study of the scale.[27]

Data collection methods

Once the research ethics committee approval and other necessary permits from the institution where this study would be conducted were ob-

tained, the patients and their relatives were called and informed about the study. The participants were given appointment and were called to the Psychiatry Polyclinic on a certain day. Those who were unable to attend the interview were interviewed by phone. Once the consents of the participants were received, they were given the questionnaires and scales through one-on-one interview method.

RESULTS

It was found that 60.8% of the participants were female, 86.3% were married and 70.6% were secondary school (and below) graduates (Table 1). The mean age of the patients participated in the study was found to be 42.0±10.9. The recipients of 100% of the patients participated in the study were found to be the relatives of the donor. 29.4% of the patients participated in the study were found to donate liver 70.6% were found to donate kidney. Among the patients participated in the study; 94.1% stated that there was no one using psychiatric medication in their family, and 23.5% stated that they themselves use psychiatric medication. Of the organ donors participated in the study, 66.7% of those who receive psychiatric medication were found to use psychiatric medication in the post-donation period.

It was found that, of the patients, 45.1% underwent their first surgery, 27.5% experienced a decrease in the quality-of-life, 98.0% did not regret for donating their organs, and 94.1% had no difficulty in the decision-making period.

Of the patients, 58.8% stated that they experienced weight change after the surgery. 90% of those who experienced weight change after surgery stated that they gained weight. Of the organ donors participated in the study, 27.5% stated that they experienced a change in their behaviors in the post-operative period. All of the patients who stated that there were behavioral changes in their social circles stated that this change was positive. Of the organ donors participated in the study, 94.1% stated that others did not prejudice them in decision-making. Among the patients participated in the study; 94.1% stated that there was no one using psychiatric medication in their family, and 23.5% stated that they themselves use psychiatric medication. Of those who receive psychiatric medication were found to use psychiatric medi cation 66.7% in the

Table 1. Distribution of certain sociodemographic characteristics of organ donors

Characteristic	Patient (n=51) n	%
Gender		
Male	20	39.2
Female	31	60.8
Marrital status		
Married	44	86.3
Single	7	13.7
Employement status		
Employed	21	41.2
Unemployed	29	56.9
Student	1	2.0
Residential area		
Village-town	10	19.6
City	41	80.4
Educational background		
Secondary school and below	36	70.6
High school	11	21.6
University	4	7.8
Age		
20-29	5	9.8
30-39	21	41.2
40-+	25	49.0

Table 2. SF-36 averages of participants compared to Turkish society standards (Ankara, 2018)

	Patient (n=51) Mean±SD	Turkish population standards Mean±SD	p
Physical function	92.6±6.5	86.6±25.2	<0.001
Difficulty in physical role	95.0±17.3	89.5±29.6	0.025
Difficulty in emotional role	88.8±28.0	94.7±20.9	0.145
Energy-liveliness	74.1±26.3	67.0±13.8	0.059
Mental health	82.3±19.9	73.5±11.6	0.002
Social Functioning	88.9±22.1	94.8±14.2	0.066
Pain	90.1±14.1	86.1±20.6	0.045
Perception on general health	58.1±16.1	73.9±17.5	<0.001

post-donation period.

By comparing the donors who participated in the study with the Turkish population standards, it was found that the patient group obtained significantly higher scores than the society average in subscales 'physical function', 'difficulty in physical role', 'mental health' and 'pain' among the quality-of-life subscales.[28] No significant difference was found between the two groups, in terms of difficulty in emotional role, energy and liveliness, social functioning and perception on general health (Table 2).

Of the patients included in the study, no signifycant difference was found between the liver and kidney donors in terms of their anxiety levels, depression levels and quality-of-life (Table 3).

Table 3. Distribution of BAI, BDI and SF-36 mean points of participants

	Kidney donor (n=36) Mean±SD	Liver donor (n=15) Mean±SD	p
BAI total score	5.8±5.3	3.5±2.3	0.125
BDI total score	5.1±7.3	3.5±2.83	0.425
Physical function	91.8±6.9	94.6±5.2	0.155
Difficulty in physical role	93.0±20.3	100.0±0.0	0.195
Difficulty in emotional role	90.7±24.7	84.4±36.3	0.536
Energy-liveliness	76.1±26.3	69.3±26.5	0.413
Mental health	83.1±20.0	80.5±16.5	0.663
Social functioning	89.2±22.7	88.3±21.3	0.896
Pain	89.5±14.2	91.6±14.3	0.636
Perception on general health	58.6±16.5	57.0±15.5	0.749

BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory

The mean score of BAI in organ donors was 5.0±4.6 and the total mean BDI score therein was 4.6±6.3.

Among the donors participated in our study, the rate of those with moderate to severe depression was found to be 3.9% and of those with moderate to severe anxiety was found to be 'zero' (Table 4).

Table 4. Distributions of clinical facts corresponding to BDI and BAI total points of the donors participated in the study

	Patient (n=51) n	%
BDI total points		
0 to 18 (no or minimum depression)	49	96.1
19-63 (moderate to severe depression)	2	3.9
BAI total points		
0 to 15 (no or slight anxiety)	51	100.0
16 to 63 (moderate to severe anxiety)	0	0

DISCUSSION

Organ donation is an altruistic behavior. It is a sacrifice made without expecting a response.

The literature reveals that the relationship between altruism and depression is clear. In their studies, Krueger et al. and Dulin et al. found a correlation between the altruism and the positive affect and positive emotions.[29,30] Besides, Brown et al. set forth that behavior of 'help' in the grief process accelerates the relief of depressive symptoms over time. Schwartz proposed it in his study that helping is associated with lower levels of depression and anxiety.[13] The total mean BDI

score in organ donors was found to be 4.6±6.3, and this the rate of those with moderate to severe depression is 3.9% according to the BDI score. The total BAI mean score in organ donors was found to be 5.0±4.6, and this the rate of those with moderate to severe anxiety is 'zero' according to the BAI score. According to WHO's 2015 data, the frequency of depression is 4.4% whilst that of the anxiety disorder is 4% in Turkey.[20] In compliance with the above-mentioned researches in the literature, our study found that the donors had low levels of anxiety and depression after donation, which is an altruistic behavior, and had a higher quality-of-life given the four of the eight subcategories of quality-of-life scale (physical function, difficulty in physical role, mental health, pain). In terms of other four subscales (difficulty in emotional role, energy-liveliness, social functioning and perception on general health), no significant difference was found.

These results can be explained by the fact that the possible mental and bodily pathologies in live donors are already excluded during the selection process for donors. On the other hand, these findings may also be because 27.5% of the patients stated that there was a positive behavioral change towards themselves in their social circle during the post-operative period, because this may be correlated with higher social support and accordingly lower anxiety, depression, and higher quality-of-life.

However, the fact that an altruistic behavior such as donation protects the person against depression and anxiety, may also be another important cause of these findings.

A weight gain of 52.9% in organ donors during the post-operative period stands out as quite a high rate. This may be important as it may lead to some post-operative mental and physical health consequences in the mid to long term, so the patient may be warned about this before the surgery.

In order to clarify a correlation that we discovered in patients included in our study, the results in this study need to be replicated in a larger number of patient populations.

Organ donation may be an altruistic behavior acting as a defensive mechanism protecting the individual against mental disorders such as depression and anxiety and increasing the quality-of-life.

REFERENCES

1. *Noyan MA, Önen Sertöz Ö, Elbi H, Çetin Ö. Canlıdan organ naklinde ruhsal değerlendirme. Anadolu Psikiyatri Derg 2011; 12:84-89.*
2. *Kumar BNA, Mattoo SK. Organ transplant & the psychiatrist: An overview. Indian J Med Res 2015; 141(4):408-416.*
3. *Lentine KL, Schnitzler MA, Xiao H, Axelrod D, Davis CL, Mc Cabe M, et al. Depression diagnoses after living kidney donation: linking U.S. Registry data and administrative claims. Transplantation 2012; 94(1):77-83.*
4. *Clemens KK, Thiessen-Philbrook H, Parikh CR, Yang RC, Karley ML, Boudville N et al. Psychosocial health of living kidney donors: a systematic review. Am J Transplant 2006; 6(12):2965-2977.*
5. *Kimura H, Onishi Y, Sunada S, Kishi S, Suzuki N, Tsuboi C, et al. Postoperativie psychiatric complications in living liver donors. Transplant Proc 2015; 47(6):1860-1865.*
6. *Timmerman L, Timman R, Laging M, Zuidema WC, Beck DK, IJzermans JN et al. Predicting mental health after living kidney donation: the importance of psychological factors. Br J Health Psychol 2016; 21(3):553-554.*
7. *Butt Z, Dew MA, Liu Q, Simpson MA, Smith AR, Zee J, et al. Psychological outcomes of living liver donors from a multi-center, prospective study: results from the adult to adult living donor liver transplantation cohort study (A2ALL). Am J Transplant 2017; 17(5):1267-1277.*
8. *Erim Y, Beckmann M, Valentin-Gamazo C, Malago M, Frilling A, Schlaak JF, et al. Quality-of-life and psychiatric complications after adult living donor liver transplantation. Liver Transplantation 2006; 12(12):1782-1790.*
9. *Faeder S, Moschenross D, Rosenberger E, Dew MA, DiMartini A. Psychiatric aspects of organ transplantation and donation. Curr Opin Psychiatry 2015; 28(5):357-364.*
10. *Jowsey SG, Jacobs C, Gross CR, Hong BA, Messersmith EE, Gillespie BW et al. Emotional well-being of living kidney donors: findings from the RELIVE Study. American Journal of Transplantation: Official Journal of the American Society of Transplantation and the American Society of Transplant Surgeons 2014;14(11):2535-2544.*
11. *Rossi, A.S. Social responsibility to family and community. OG Brim, CD Ryff, RC Kessler (Eds.), How Healthy are we? A National Study of Well Being at Mid-Life. Chicago: University of Chicago Press, 2004, pp.550-585.*

12. *Schwartz CE, Sendor M. Helping others helps oneself: response shift effects in peer support. Soc Sci Med 1999; 48(11):1563-1575.*
13. *Schwartz C, Meisenhelder JB, Ma Y, Reed G. Altruistic social interest behaviors are associated with beter mental health. Psychosom Med 2003; 65(5):778-785.*
14. *Brown SL, Nesse RM, Vinokur AD, Smith DM. Providing social support may be more beneficial than receiving it: results from a prospective study of mortality. Psychol Sci 2003; 14(4):320-327.*
15. *Fujiwara T, The role of altruistic behavior in generalized anxiety disorder and major depression among adults in the United States. J Affect Disord 2007; 101(1-3):219-225.*
16. *Parikh ND, Ladner D, Abecassis M, Butt Z. Quality-of-life in donors after living donor liver transplantation: a review of the literature. Liver Transpl 2010; 16(12):1352-1358.*
17. *Ladner DP, Dew MA, Forney S, Gillespie BW, Brown RS Jr, Merion RM, et al. Long-term quality-of-life after liver donation in the adult to adult living donor liver transplantation cohort study (A2ALL). J Hepatol 2015; 62(2):346-353.*
18. *Özçürümez G, Tanrıverdi N, Zileli L. Böbrek transplantasyonu ve psikiyatri. Klinik Psikiyatri 2003; 6:225-234.*
19. *Popoola J, Greene H, Kyegombe M, Mac Phee IA Patient involvement in selection of immunosuppressive regimen following transplantation. Patient Prefer Adherence 2014; 8:1705-1712.*
20. *GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet 2016; 388(10053):1545-1602.*
21. *WHO. Depression and Other Common Mental Disorders. Global Health Estimates, WHO, 2017, p.8,10,20.*
22. *Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961; 4:561-571.*
23. *Hisli N. A validity study about Beck Depresssion Inventory. Psikoloji Dergisi 1988; 6(22):118-122.*
24. *Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). Conceptual framework and item selection. Med Care 1992; 30(6):473-483.*
25. *Koçyiğit H, Aydemir Ö, Fişek G, Ölmez N, Memiş A. Reliability and validity of the Turkish Version of Short Form-36 (SF-36). İlaç ve Tedavi Dergisi 1999; 12(2):102-106.*
26. *Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: Psychometric properties. J Consult Clin Psychol 1988; 56:893-897.*
27. *Ulusoy M, Şahin N, Erkmen H. Turkish Version of The Beck Anxiety Inventory: psychometric properties. J Cognitive Psychotherapy Int Quaterly 1998; 12:28-35.*
28. *Demiral Y, Ergör G, Ünal B, Semin S, Akvardar Y, Kıvırcık B, et al. SF-36 yaşam kalitesi ölçeğinin genel toplum örneğinde güvenilirliği. 1. Sağlıkta Yaşam Kalitesi Sempozyumu Özet Kitabı. İzmir, Emek Matbaası, 2004, p.45*
29. *Krueger RF, Hicks BM, McGue M. Altruism and antisocial behavior: Independent tendencies, unique personality correlates, distinct etiologies. Psychological Science 2001; 12(5):397-402.*
30. *Dulin PL, Hill RD, Anderson J, Rasmussen D. Altruism as a predictor of life satisfaction in a sample of low-income older adult service providers. Journal of Mental Health and Aging 2001; 7(3):349-360.*