

# Differences in the emotional state among people with diabetes mellitus and the importance of job satisfaction

Sotiriou Anastasia, Lekka Dimitra, Stalikas Anastasios

## Summary

*The study investigates the emotional differences between those who have regulated diabetes and those who haven't, as well as the potential relationship between job satisfaction and diabetes regulation. The sample consists of 204 people, 148 women and 56 men, aged 18-76 years old, from various parts of Greece. The DASS-21 scale was used to measure anxiety, depression and stress, the Spane-8 scale was used to measure positive and negative emotions, the LOT scale was used to measure optimism and the Multi-dimensional scale of Perceived Support was used to measure the perceived support of the individuals. The results show that people with regulated diabetes have more positive emotions and perceived support from their family, while people with no regulated diabetes score higher on anxiety, depression and stress. Finally, a relationship appears between positive emotions, optimism and perceived social support with job satisfaction but no connection was found between job satisfaction and diabetes regulation.*

**Keywords:** positive emotions· optimism· support· diabetes· regulation.

## Introduction

According to the World Health Organization (WHO, 2021), diabetes mellitus is a rare disease which occurs when the human pancreas does not produce enough insulin, the hormone that regulates blood sugar levels, or when it cannot properly use the insulin it produces. Diabetes mellitus (WHO,2019) causes hyperglycaemia in the individual with characteristic symptoms the appearance of thirst, polyuria, blurred vision, weight loss and genital infection. If hyperglycemia is not controlled and stays for a long time, it can cause serious health problems, such as retinopathy, neuropathy, nephropathy, while it also increases the likelihood of cardiovascular and cerebrovascular diseases, obesity, cataract, erectile dysfunction, non-alcoholic liver disease, and also the manifestation of infectious diseases in the individual, such as tuberculosis. In addition to the physical effects, diabetes has been found to be associated in some cases with the experience of many negative emotions (Hagger et al., 2016) as well as with a greater likelihood of developing symptoms of depression, anxiety and stress (Shahi et al., 2017). According to Farouhi et al. (2019) it is estimated that in 2017, 425 million people had diabetes, number that is expected to reach 629 million in 2045, while type 2 diabetes accounts for over 80% of cases. Apart from the direct consequences that diabetes causes to people, it is also a growing problem for the global economy since it is predicted that in 2030 the economic costs of the disease will increase from 61% to 88% compared to those in 2015(Bommer et al., 2017).

Diabetes management requires systematic effort and compliance with medication, diet and exercise (Shamim et al., 2018). In order for diabetes to be considered regulated, the value of glycosylated hemoglobin must be less than 7%. When the value is more than 7%, then the regulation is bad (ADA,2022). There are various factors that influence patient adherence to the diabetes management behaviours, such as the perception of the disease severity and knowledge about the disease (Kugbey et al., 2017), the complexity of the pharmaceutical treatment (de Vries et al., 2014), the feeling of trust towards the doctor (Halepian et al., 2018) as well as the type of treatment, since for example, injectable insulin seems to cause more discomfort to the individual in relation to treatment by mouth or diet (Delahanty et al., 2007). There isn't any research examining the relationship between job satisfaction and diabetes management, however it appears that job satisfaction and the sense that one's job has meaning,

Panteion University of Social and Political Sciences

Responsible Correspondence: Sotiriou Anastasia, Roikou 32  
Email: Anastasia.sotiriou99@gmail.com, TIn: 6984026906

reduces level's of anxiety, depression and stress (Allan et al., 2018), while it also seems that positive emotions are connected with job satisfaction and commitment (Parker et al., 2012). Therefore it is likely that job satisfaction may influence positively diabetes management by increasing positive emotions and decreasing symptoms of depression, anxiety and stress.

### 1.1 Positive emotions

According to Fredrickson (2014), for a lot of years the interest of the scientific community was focused on negative emotions, which is possibly due to the fact that they did and do produce a multitude of problems in people both on an individual and social level, such as anxiety disorders, phobias, aggression, depression, suicidal ideation etc. It has also been observed that since the time of our ancestors, negative emotions contribute to the mobilization of the individual for action (fight or flight) having an adaptive function, while the positive ones, although they also have an adaptive function, this is not so apparent at the given moment of their experience but it becomes apparent later in the person's life. Summarizing all that has been recorded regarding the functions of positive emotions, they a) broaden people's attention and thinking, b) reduce the negative emotional arousal caused by negative emotions, c) strengthen mental resilience, d) strengthen personal resources, e) experiencing them predicts greater prosperity in the future, f) they help people to fulfill themselves (Fredrickson, 2004). Moreover, the expression of positive emotions improves the quality of relationships, it shapes and improves the impression that the individual gives to those around him about himself, and can positively influence either the actions or the emotions of other people (Sels et al., 2021).

### 1.1 Positive emotions

According to Fredrickson (2014), for a lot of years the interest of the scientific community was focused on negative emotions, which is possibly due to the fact that they did and do produce a multitude of problems in people both on an individual and social level, such as anxiety disorders, phobias, aggression, depression, suicidal ideation etc. It has also been observed that since the time of our ancestors, negative emotions contribute to the mobilization of the individual for action (fight or flight) having an adaptive function, while the positive ones, although they also have an adaptive function, this is not so apparent at the given moment of their experience but it becomes apparent later in the person's life. Summarizing all that has been recorded regarding the functions of positive emotions, they a) broaden people's attention and thinking, b) reduce the negative emotional arousal caused by negative emotions, c) strengthen mental resilience, d) strengthen personal resources, e) experiencing them predicts greater prosperity in the future, f) they help people to fulfill themselves (Fredrickson, 2004). Moreover, the expression of positive emotions improves the quality of relationships, it shapes and improves the impression that the

individual gives to those around him about himself, and can positively influence either the actions or the emotions of other people (Sels et al., 2021).

### 1.3 Perceived social support

Social support is defined as the experience of being loved or cared for by others, of feeling respected and valued, and being part of a social network of mutual help and obligation (Wills, 1991). It can derive from a partner, relatives, friends, colleagues, from social and community ties, even from a pet (Allen et al., 2002). Support can have many forms, for example there is informational support where help is provided to the individual so that he understands and is properly informed about how he can deal with his problem, material support which refers to the provision of material-practical help to the individual, such as providing financial assistance or transportation, and emotional support which refers to the warmth and reassurance of the individual that he is valuable and others care about him. The social support that one has is not always the same with the support that he feel he has (Haber et al., 2007), whereas whether networks are perceived as supportive or not depends on various factors such as how large and dense they are, whether the support provided is appropriate for the specific condition, 6ignifir the appropriate form of support comes from the appropriate person (Taylor, 2011). According to τούς Cohen & Wills (1985) social support has a positive impact on mental health either directly or through the reduction of stress experienced by the individual.

## 2. Method

### 2.1 Demographics

The criterion for participation in the research was that all individuals have any type of diabetes and are over 18. The sample collected was 204 individuals with the majority being female (75.5%), while the age of the sample ranged between 18 to 76 years with an average of 45.5 years. Specifically, 40 people are 18-35 years old (19.6%), 53 people are 36-45 years old (26%), 72 people are 46-55 years old (35.3%) and 39 people are 56-76 years old (19.1 %). Regarding the professional status of the participants, 31.9% are not working, 25% are self-employed, 23.5% are public employees and 19.1% are self-employed. 42.2% of working participants experience a lot or total job satisfaction, 22.5% moderate and 5.4% little to no satisfaction.

## 2. 2 Data collection

### 2.2.1 Scale of positive and negative experience (Spane-8)

The scale of positive and negative experience (Scale of positive and negative experience, Spane-8) was con-

structed by Diener et al. (2009) and is adapted in Greek (Kyriazos et al., 2018). The scale measures pleasant and unpleasant experiences related to feelings or emotional states of well-being or not well-being, asking individuals to recall recent activities and experiences that durinh the last 4 weeks and the duration of experiencing the positive or negative emotions that correspond to them. It consists of 12 questions and 6 of them are about the positive emotions (e.g. "I felt positive") and the other 6 about the negative ones (e.g. "I was feeling negative"). Grading is done according to a 5-point Likert scale in which 1 corresponds to "very rarely" and 6 to "very often/always". The score results from the sum of the individual's responses, and based on it, either the positive emotions (Spaen-P) or the negative ones (Spaen-N) are measured, while if the score of negative emotions is subtracted from that of the positives, the balance between them emerges (Spaen-B). The scale has internal consistency reliability at its subscales and specifically the subscale of positive emotions (Spaen-P) has Cronbach's  $\alpha=.85$ , the subscale of negative emotions (Spaen-N) has Cronbach's  $\alpha=.75$  and also the balance subscale (Spaen-B) has Cronbach's  $\alpha=.84$ , and the scale also has convergent validity. In the present research, both the scale of positive emotions as well as negative ones have also satisfactory internal consistency with Cronbach's  $\alpha=.93$  and Cronbach's  $\alpha=.88$  respectively, and the subscale of emotional balance has an internal consistency Cronbach's  $\alpha=.73$ .

### 2.2.2 Life Orientation Test (LOT)

The second scale used is the optimism scale (LOT), which has been adapted to Greek by Moustaki & Stalikas (2012) and is based on in the original scale constructed by Scheier & Carver (1985). This scale measures the individual's overall dispositional optimism as an element of his personality. It includes 8 self-report questions of which 4 are about the expectation of negative outcomes (e.g. "I think that if there is something that can end wrong for me, it will ") and the other 4 are about the e"pectation of positives (e.g. "In uncertain situations I expect the bes"). Grading is done using a 5-point scale Likert in which 1 corresponds to "strongly disagree" and 5 to "strongly agree". The score is obtained by adding the answers to each question, after inversion of the grade of the inverted qu"stions, with the highest values to show higher rates of optimism. The scale has internal reliability consistency both in the optimism subscale with Cronbach's  $\alpha=.73$ , and in pessimism subscale with Cronbach's  $\alpha=.63$ , and also the questionnaire as a whole has a consistency of Cronbach's  $\alpha=.74$ . In the present research the internal reliability is also satisfying for the scale as a whole with Cronbach's  $\alpha=.82$ , as well as in the optimism subscale with Cronbach's  $\alpha=.84$ , and in the pessimism subscale with Cronbach's  $\alpha=.70$  respectively.

### 2.2.3 Multidimensional Scale of Perceived Social Support

The scale of perceived social support was con-

structed in 1988 by Zimet et al. and has been translated and adapted into Greek by Theofilou (2015). It consists of 12 questions and studies the perceived support a person experience's from the family (e.g. "My family really tries to help"), from friends (e.g. "I can rely on my friends when things are not going well") and from significant others (e.g. "There is a person close me when I need him"). In each of these three dimensions, 4 correspond questions. Grading is done using a 7-point Likert scale, in which 1 corresponds to "strongly agree" and 7 to "strongly disagree". The score is calculated by adding to each dimension the answers that belong to it and then dividing the result by 4, and adding all the answers in total and dividing the result by 12. In this research there is significant internal consistency of the scale as a whole with Cronbach's  $\alpha=.95$ , as well as in the subscale of the significant other with Cronbach's  $\alpha=.94$ , the subscale of family with Cronbach's  $\alpha=.95$  and the subscale of friends with Cronbach's  $\alpha=.96$ .

### 2.2.4 Depression Anxiety Stress Scale-21 (DASS 21)

Finally, participants answered the Dass-21 scale (Depression Anxiety Stress Scale-21), which is the short form of the Dass-42 scale that was constructed in 1995 by Lovibond & Lovibond. The original Dass-42 scale has been translated into Greek by Lyrakos et al. (2011). The Dass-21 scale consists of 21 questions and each dimension under measurement concerns 7 questions. The depression scale (Depression scale) consists of seven questions that assess discomfort, helplessness, devaluation of life, self-destruction, lack of interest, the inactivity and anhedonia (e.g. "I could not experience any positive emotions"). The Anxiety scale consists of 7 questions that evaluate the autonomic stimulation, the influence of skeletal muscles, the experience of stress in specific situations and the subjective experience of anxiousness (e.g. "I felt that my mouth was dry"). Finally, the stress scale consists of 7 questions and measures chronic non-specific arousal levels. Specifically, it evaluates the difficulty in relaxing, nervousness and how easily one gets upset, agitated, irritated, overreacts and loses patience (e.g. "I couldn't calm myself"). It has been adapted in a Greek sample by Pezirkianidis et al. (2018) and it has good internal reliability in all its subscales, with the depression scale having Cronbach's  $\alpha=.85$  and the anxiety subscale Cronbach's  $\alpha=.84$  and the stress subscale Cronbach's  $\alpha=.84$ . The total scale also has convergent and discriminant validity. Grading is done using a 4-point Likert scale where 0 corresponds to "Did not apply to me at all" and 3 to "Applied to me all or most of the time times". The score for each dimension results from the sum of the answers to the 7 questions that are about it, while adding all the answers, the negative emotional state is obtained. In this research, the internal consistency scale is significant in all the subscales. The stress scale has Cronbach's  $\alpha=.90$ , the anxiety scale has Cronbach's  $\alpha=.88$  and the depression scale has Cronbach's  $\alpha=.92$ .

## 2.2.5 Basic statistical tests and analyses

The demographic data obtained from the study were examined, initially with help of Descriptive Statistics. Then, the research a series of analyses were made, including the use of Correlation, t-test, as well as x2 correlation testing. The Statistical Package for the Social Sciences, IBM Statistics 28.0 was used for the analyses.

## 3. Results

To test whether the average of positive emotions, optimism and perceived social support differed between people with regulated and unregulated ed diabetes, independent samples t-test were used. The results showed that people with regulated diabetes have a higher mean value on the scales of positive emotions, optimism and perceived social support than people with unregulated diabetes, however the only differences that are statistical significant are those regarding positive emotions (M.O=20.8, T.A=5.5 vs. M.O=19, T.A=5.4),  $t(202)=2.28$ ,  $p<.05$  and the perceived support from the family (M.O=5.5, T.A=1.7 vs M.O=4.9, T.A=1.8),  $t(202)=2.53$ ,  $p<.05$ .

To examine whether the average of negative emotions and symptoms of anxiety, depression and stress differed between people with regulated and unregulated diabetes, independent samples t-test (independent samples t-test) were also used. The results of the analysis showed with statistical significance that higher levels of depression, anxiety and stress are experienced by people with unregulated diabetes, compared to those who have controlled, but there was no statistically 10ignificant difference in the levels of negative emotions ( $p>.05$ ). Specifically, people with unregulated diabetes have more symptoms of depression (M.A=7.9, T.A=6.3 vs. M.A=6, T.A=5.9),  $t(202)=-2.22$ ,  $p<.05$ , more anxiety (M.A=8.2, T.A=6.2 vs. M.A=5.9 T.A=5.3),  $t(147.80)=-2.65$ ,  $p<.01$  and more stress (M.A=10.5, T.A=5.7 vs. M.A=8.5, T.A=6),  $t(202)=-2.32$ ,  $p<.05$ .

In order to determine whether job satisfaction is associated with fewer negative emotions and fewer symptoms of anxiety, depression, independent samples t-test were used. The results of the analysis show that stress levels are higher in people who have no satisfaction or moderate satisfaction (M.O=7.9, T.A=5.7) compared to people who have a lot of satisfaction or absolute (M.O=5.6, T.A=5.6),  $t(141)=2.41$ ,  $p<.05$ . The same happens with the levels of depression (M.O=9.1, T.A=6 vs. M.O=4.4, T.A=4.8),  $t(101,041)=4.95$ ,  $p<.01$ , as well as with stress levels (M.O=11.4, T.A=5.8 vs. M.O=7.3, T.A=5.3),  $t(141)=4.44$ ,  $p<.01$  but also with negative emotions (M.O=18.1, T.A=5.9 vs. M.O=14, T.A=5.3),  $t(141)=4.39$ ,  $p<.01$ .

To investigate whether job satisfaction is positively related to positive emotions, optimism and perceived social support, and specifically if a lot of satisfaction is associated with a higher score on these variables while none to little satisfaction is associated with less, an independent samples t-test was used. The results show that people with a lot of or absolute job satisfaction, have more positive emotions

(M.A=22.3, T.A=4.4 vs. M.A=17.5, T.A=5.2),  $t(141)=-5.99$ ,  $p<.01$  and more optimism (M.A=30.2, T.A=5.7 vs. M.A=26.2, T.A=6),  $t(141)=-4.10$ ,  $p<.01$  than those with little or not at all. They also present more perceived support from a significant other (M.A=5.8, T.A=1.5 vs. M.A=5.1, T.A=1.8),  $t(104,312)=-2.25$ ,  $p<.05$ , more perceived support from friends (M.A=5.1, T.A=1.8 vs M.A=4.4, T.A=1.9),  $t(141)=-2.04$ ,  $p<.05$ , more perceived support from family (M.A=5.6, T.A=1.6 vs. M.A=4.8, T.A=2),  $t(104,095)=-2.35$ ,  $p<.05$  as well as more overall perceived social support (M.A=5.5, T.A=1.4 vs. M.A=4.8, T.A=1.6),  $t(141)=-2.59$ ,  $p<.05$ . Therefore, those who have high job satisfaction experience more positive emotions, optimism and more social support.

Finally, a chi-square test was used to examine the relationship (relevance) of job satisfaction with diabetes management. According to the the results, the correlation of job satisfaction with diabetes management is not statistically significant ( $p>.05$ ), so job satisfaction is not associated with diabetes management.

## 4. Discussion

The results of the research showed that people with unregulated diabetes have higher levels of anxiety, depression and stress, but not higher levels of negative emotions, than people with regulated diabetes. According to Shahi et al. (2017) having diabetes increases the likelihood of anxiety, depression and stress, while Hagger et al. (2016) report that a number of negative emotions can arise from the disease, however these do not always manifest to the same extent and with the same intensity. So the present finding does not contradict the existing literature but adds to it.

Furthermore, in the present study results showed a significant difference in levels of positive emotions and perceived family support between people with regulated and unregulated diabetes, with people with regulated diabetes scoring higher on these scales. Based on Fredrickson's (1998) theory of broadening and building positive emotions, these are likely to lead to an increase in both the likelihood of experiencing them again in the future and to an increase in the support perceived by people with diabetes, through the strengthening of social resources. A possible reason for this finding could possibly be either the absence or the existence of a small network of friends and significant others, resulting in individuals investing more in their family relationships than in friendships. At the same time, family and partner support seems to be the most helpful source of support for people with diabetes (Mayberry & Osborn, 2012), due to the direct help offered to the diabetic person on a daily basis by them.

On the other hand, those with unregulated diabetes are likely to not perceive the same level of support from their family due to their distress they experience due to poor management of the disease, which in turn may cause greater distress and feelings of loneliness. The research by Wang et al. (2018) for example showed that depression reduces the perception of social support, and as it is extracted from this previous finding, depression appears significantly greater in

people with unregulated diabetes.

It is also possible that people with unregulated diabetes in the sample of the present research, do not actually have a supportive family network, which in turn worsens the regulation of the disease. The research by Wang et al. (2018) showed that mood and anxiety disorders worsen when individuals feel less social support, which combined with the finding in this research that people with unregulated diabetes do not feel statistically significant social support from anyone, supports the previous finding that demonstrated the existence of greater psychopathology in these individuals.

Another finding of the present research is that people with a lot or total job satisfaction show higher rates of positive emotions, optimism, perceived social support, as well as perceived support from family, friends and significant others, in relation to with people with no to moderate job satisfaction. There are studies that show a connection between positive emotions and job satisfaction, such as that of Parker et al. (2012), where positive emotions led to greater job satisfaction and greater work engagement. This may be due to the fact that employees who experience positive emotions are likely to feel more positive about their work abilities and also positive emotions, personal resources and work engagement are mutually reinforcing (Ouweneel et al., 2012). Experiencing these positive emotions, possibly also causes the feeling of experiencing greater support from the person's surroundings. The present research also showed that those who have no to moderate job satisfaction have lower rates of stress, anxiety and depression, which is in agreement with previous research such as that of Allan et al. (2018).

Finally, no significant correlation was found between job satisfaction and better diabetes regulation. Whether subjects reported a lot or total job satisfaction or no to moderate job satisfaction, there was no significant difference in their glycated hemoglobin levels. This is a relationship that has not been particularly studied to date and therefore there is not much material to draw more information from.

## 5. Limitations

The present research has some important limitations, which should be taken into account and the main one concerns the sample, as women significantly outnumber men, and therefore the results that emerged are mainly based on women. It would therefore be beneficial in a re-conduct of the research to obtain a larger male sample, as well as a larger sample in general, so that generalization can be made more easily. Also, although no correlation was found between job satisfaction and diabetes management, a more targeted research on this relationship and with a larger sample of employees would be useful, to examine either a direct or indirect relationship that this variable has.

## References

- Albuquerque, C., Correia, C., & Ferreira, M. (2015). Adherence to the therapeutic regime in person with type 2 diabetes. *Procedia-Social and Behavioral Sciences*, 171, 350-358. <https://doi.org/10.1016/j.sbspro.2015.01.132>
- Allan, B. A., Dexter, C., Kinsey, R., & Parker, S. (2018). Meaningful work and mental health: Job satisfaction as a moderator. *Journal of Mental Health*, 27(1), 38-44. <https://doi.org/10.1080/09638237.2016.1244718>
- Allen, K., Blascovich, J., & Mendes, W. B. (2002). Cardiovascular reactivity and the presence of pets, friends, and spouses: The truth about cats and dogs. *Psychosomatic medicine*, 64(5), 727-739. <https://psycnet.apa.org/doi/10.1097/01.PSY.0000024236.11538.41>
- American Diabetes Association [ADA]. Understanding A1C. Retrieved March 2022 from <https://www.diabetes.org/diabetes/a1c>
- Bommer, C., Heesemann, E., Sagalova, V., Manne-Goehler, J., Atun, R., Bärnighausen, T., & Vollmer, S. (2017). The global economic burden of diabetes in adults aged 20–79 years: a cost-of-illness study. *The Lancet Diabetes & endocrinology*, 5(6), 423-430. [https://doi.org/10.1016/S2213-8587\(17\)30097-9](https://doi.org/10.1016/S2213-8587(17)30097-9)
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98(2), 310–357. <https://doi.org/10.1037/0033-2909.98.2.310>
- Craig, H., Freak-Poli, R., Phyo, A. Z. Z., Ryan, J., & Gasevic, D. (2021). The association of optimism and pessimism and all-cause mortality: A systematic review. *Personality and Individual Differences*, 177, 110788. <https://doi.org/10.1016/j.paid.2021.110788>
- de Vries, S. T., Keers, J. C., Visser, R., de Zeeuw, D., Haaijer-Ruskamp, F. M., Voorham, J., & Denig, P. (2014). Medication beliefs, treatment complexity, and non-adherence to different drug classes in patients with type 2 diabetes. *Journal of psychosomatic research*, 76(2), 134-138. <https://doi.org/10.1016/j.jpsychores.2013.11.003>
- Gloria, C. T., & Steinhardt, M. A. (2016). Relationships among positive emotions, coping, resilience and mental health. *Stress and Health*, 32(2), 145-156. <https://doi.org/10.1002/smi.2589>
- Haber, M. G., Cohen, J. L., Lucas, T., & Baltes, B. B. (2007). The relationship between selfreported received and perceived social support: A meta-analytic review. *American journal of community psychology*, 39(1), 133-144. <https://doi.org/10.1007/s10464-007-9100-9>
- Halepian, L., Saleh, M. B., Hallit, S., & Khabbaz, L. R. (2018). Adherence to insulin, emotional distress, and trust in physician among patients with diabetes: a crosssectionalstudy. *Diabetes Therapy*, 9(2), 713-726. <https://doi.org/10.1007/s13300-018-0389-1>
- Delahanty, L., Grant, R. W., Wittenberg, E., Bosch, J. L., Wexler, D. J., Cagliero, E., & Meigs, J. B. (2007). Association of diabetes related emotional distress with diabetes treatment in primary care patients with type 2 diabetes. *Diabetic medicine*, 24(1), 48-54. <https://doi.org/10.1111/j.1464-5491.2007.02028.x>
- Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2009). New measures of well-being. In E. Diener (Ed.), *Assessing well-being: The collected works of Ed Diener* (Vol. 39, pp. 247–266). New York: Springer. <https://doi.org/10.1007/978-90-481-2354-4>
- Forouhi, N. G., & Wareham, N. J. (2019). Epidemiology of diabetes. *Medicine*, 47(1), 22- 27. <https://doi.org/10.1016/j.mpmed.2018.10.004>
- Fredrickson, B. L. (2004). The broaden-and-build theory of positive emotions. *Philosophical transactions of the royal society of London. Series B: Biological Sciences*, 359(1449), 1367-1377. <https://doi.org/10.1098/rstb.2004.1512>
- Fredrickson, B. L. (2013). Positive Emotions Broaden and Build. *Advances in Experimental Social Psychology*, 47, 1–53. <https://doi.org/10.1016/B978-0-12-407236-7.00001-2>
- Fredrickson, B.L., & Levenson, R. W. (1998). Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition & emotion*, 12(2), 191-220. <https://doi.org/10.1080/026999398379718>
- Giltay, E. J., Geleijnse, J. M., Zitman, F. G., Buijsse, B., & Kromhout, D. (2007). Lifestyle and dietary correlates of dispositional optimism in men: The Zutphen Elderly Study. *Journal of psychosomatic research*, 63(5), 483-490. <https://doi.org/10.1016/j.jpsychores.2007.07.014>
- Hagger, V., Hendrieckx, C., Sturt, J., Skinner, T. C., & Speight, J. (2016). Diabetes distress among adolescents with type 1 diabetes: a systematic review. *Current diabetes reports*, 16(1), 1-14. <https://doi.org/10.1007/s11892-015-0694-2>
- Ironson, G. H. (2008). Do positive psychosocial factors predict disease progression in HIV-1? A review of the evidence. *Psychosomatic medicine*, 70(5), 546-554. <https://dx.doi.org/10.1097%2FPSY.0b013e318177216c>
- Kim, E. S., Smith, J., & Kubzansky, L. D. (2014). Prospective study of the association between dispositional optimism and incident heart failure. *Circulation: Heart Failure*, 7(3), 394-400. <https://doi.org/10.1161/CIRC-HEARTFAILURE.113.0006>
- Krass, I., Schieback, P., & Dhippayom, T. (2015). Adherence to diabetes medication: a systematic review. *Diabetic Medicine*, 32(6), 725-737. <https://doi.org/10.1111/dme.12651>
- Kugbey, N., Oppong Asante, K., & Adulai, K. (2017). Illness perception, diabetes knowledge and self-care practices among type-2 diabetes patients: a cross-sectional study. *BMC research notes*, 10(1), 1-7. <https://doi.org/10.1186/s13104-017-2707-5>
- Kyriazos, T. A., Stalikas, A., Prassa, K., & Yotsidi, V. (2018). A 3-faced construct validation and a bifactor subjective well-being model using the scale of positive and negative experience, Greek version. *Psychology*, 9(05), 1143-1175. <https://doi.org/10.4236/psych.2018.95071>
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour research and therapy*, 33(3), 335- 343. [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U)
- Lyrakos, G. N., Arvaniti, C., Smyrnioti, M., & Kostopanagioutou, G. (2011). Translation and validation study of the depression anxiety stress scale in the Greek general population and in a psychiatric patient's sample. *European Psychiatry*, 26(S2), 1731-1731. [https://doi.org/10.1016/S0924-9338\(11\)73435-6](https://doi.org/10.1016/S0924-9338(11)73435-6)
- Matthews, K. A., Räikkönen, K., Sutton-Tyrrell, K., & Kuller, L. H. (2004). Optimistic attitudes protect against progression of carotid atherosclerosis in healthy middle-aged women. *Psychosomatic medicine*, 66(5), 640-644. <https://psycnet.apa.org/doi/10.1097/01.psy.0000139999.99756.a5>
- Mayberry, L. S., & Osborn, C. Y. (2014). Family involvement is helpful and harmful to patients' self-care and glycemic control. *Patient education and counseling*, 97(3), 418-425. <https://doi.org/10.1016/j.pec.2014.09.011>
- Moustaki, M., & Stalikas, A. (2012). Life Orientation Test (LOT). In A. Stalikas, S. Triliva, & P. Roussi (Eds.), *Psychometric Instruments in Greece* (2nd ed., p. 529). Athens: Pedio
- Mulkana, S. S., & Hailey, B. J. (2001). The role of optimism in health-enhancing behavior. *American Journal of Health Behavior*, 25(4), 388-395. <https://doi.org/10.5993/AJHB.25.4.4>
- Ouweneel, E., Le Blanc, P. M., & Schaufeli, W. B. (2012). Don't leave your heart at home: Gain cycles of positive emotions, resources, and engagement at work. *Career Development International*, 17(6), 537-556. <https://doi.org/10.1108/13620431211280123>
- Parker, P. D., Martin, A. J., Colmar, S., & Liem, G. A. (2012). Teachers' workplace wellbeing: Exploring a process model of goal orientation, coping behavior, engagement, and burnout. *Teaching and Teacher Education*, 28(4), 503–513. <https://doi.org/10.1016/j.tate.2012.01.001>
- Pezirkianidis, C., Karakasidou, E., Lakioti, A., Stalikas, A., & Galanakis, M. (2018). Psychometric properties of the depression, anxiety, stress scales-21 (DASS-21) in a Greek sample. *Psychology*, 9(15), 2933-2950. <https://doi.org/10.4236/psych.2018.915170>
- Rincon Uribe, F. A., Neira Espejo, C. A., & Pedroso, J. D. S. (2021). The Role of Optimism in Adolescent Mental Health: A Systematic Review. *Journal of Happiness Studies*, 23, 815–845. <https://doi.org/10.1007/s10902-021-00425-x>
- Rozanski, A., Bavishi, C., Kubzansky, L. D., & Cohen, R. (2019). Association of optimism with cardiovascular events and all-cause mortality: a systematic review and metaanalysis. *JAMA Network Open*, 2(9), e1912200. <https://doi.org/10.1001/jamanetworkopen.2019.12200>
- Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology*, 4(3), 219–247. <https://doi.org/10.1037/0278-6133.4.3.219>
- Scheier, M. F., Swanson, J. D., Barlow, M. A., Greenhouse, J. B., Wrosch, C., & Tindle, H. A. (2021). Optimism versus pessimism as predictors of physical health: A comprehensive reanalysis of dispositional optimism research. *American Psychologist*, 76(3), 529–548. <https://doi.org/10.1037/amp0000666>
- Sels, L., Tran, A., Greenaway, K. H., Verhofstadt, L., & Kalokerinos, E. K. (2021). The social functions of positive emotions. *Current Opinion in Behavioral Sciences*, 39, 41-45. <https://doi.org/10.1016/j.cobeha.2020.12.009>
- Shahi, M., & Mohammadyfar, M. A. (2017). Comparison of depres-

sion, anxiety, stress, quality of life, and alexithymia between people with type II diabetes and non-diabetic counterparts. *Personality and Individual Differences*, 104, 64-68. <https://doi.org/10.1016/j.paid.2016.07.035>

Shamim, A., & Muazzam, A. (2018). Positive emotions as predictors in the management of Type II Diabetes. *Pakistan Journal of Social and Clinical Psychology*, 16(2), 27-33.

Taylor, S. E. (2011). Social support: A review. In H. S. Friedman (Ed.), *The Oxford handbook of health psychology* (pp. 189–214). Oxford University Press.

<https://doi.org/10.1093/OXFORDHB%2F9780195342819.013.0009>

Theofilou, P. (2015). Translation and cultural adaptation of the Multidimensional Scale of Perceived Social Support for Greece. *Health psychology research*, 3(1). <https://dx.doi.org/10.4081%2Fhpr.2015.1061>

Vollmann, M., & Renner, B. (2010). Better liked but not more supported: Optimism and social support from a provider's perspective. *Applied Psychology: Health and Well Being*, 2(3), 362-373. <https://doi.org/10.1111/j.1758-0854.2010.01039.x>

Wang, J., Mann, F., Lloyd-Evans, B., Ma, R., & Johnson, S. (2018). Associations between loneliness and perceived social support and outcomes of mental health problems: a systematic review. *BMC psychiatry*, 18(1), 1-16. <https://doi.org/10.1186/s12888-018-1736-5>

Wills, T. A. (1991). Social support and interpersonal relationships. In M. S. Clark (Ed.), *Prosocial behavior* (pp. 265–289). Sage Publications, Inc. <https://psycnet.apa.org/record/1991-97117-010>

World Health Organization. (2021). Diabetes. Retrieved February 2022 from <https://www.who.int/news-room/fact-sheets/detail/diabetes>

World Health Organization. (2019). Classification of Diabetes Mellitus. Retrieved February 2022 from <https://apps.who.int/iris/handle/10665/325182>

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of personality assessment*, 52(1), 30-41. [https://doi.org/10.1207/s15327752jpa5201\\_2](https://doi.org/10.1207/s15327752jpa5201_2)