EXPLAINING THE RELATIONSHIP BETWEEN AUTONOMY SUPPORT AND MOTIVATIONAL PROCESS OF HEALTH BEHAVIOR IN PATIENTS WITH DIABETES FROM SELF-DETERMINATION THEORY PERSPECTIVE: LITERATURE REVIEW

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ABSTRACT

Background. The aim of this study is to provide an overview of the research examining the relationships between contextual factor – autonomy support – and motivational process to control diabetes using self-determination theory as a guiding framework.

Methods. Overview of published literature of applying SDT examining motivation and behavior in patients with diabetes was performed. *Sage, Medline* and *Google Scholar* data basis were searched using "autonomy support and diabetes" and "self-determination and diabetes" words combinations. Literature review included cross-sectional, longitudinal research and experimental studies.

Results. Research shows that autonomy support directly affects autonomous motivation, competence and patient satisfaction. Through the mediators in the behavior motivation model - autonomy and competence – autonomy support is associated with diabetes related behavior, physiological and psychological outcomes.

Conclusions. It may be concluded that interrelationship between contextual social (relationship with health care specialists), inner psychological (motivation) and physiological (glycemic index) factors is crucial considering the content of educational programs of diabetes care. So, minimization of long-term diabetes complications, enhanced psychological health and quality of life could be expected if health professionals provide autonomy support for their diabetes patients.

Keywords: autonomous motivation, perceived competence, health-behavior.

INTRODUCTION

Health related behavior is the issue of concern for individuals who struggle to manage their diabetes, scientists, health care professionals and educators as more than a half of diabetes patients have treatment non-compliance problems (Rubin & Peyrot, 2001). This may lead to disturbed glycemic control which in turn is the strongest risk factor for developing microvascular complications, diabetic retinopathy, nephropathy and neuropathy, which, if undetected or left untreated, can lower the quality of life (Girach, Manner, & Porta, 2006). Research shows that behavioral variables as healthy eating, medication adherence and physical activity are very important for diabetes related health outcomes such as lipid ratio, hemoglobin A1C, body mass index, self-reported general health for diabetes patients (King et al., 2010). Prescription of behavior in case of diabetes usually includes blood glucose testing, insulin taking, diet with minimum sugar and fat as well as regular physical exercise. Moreover, these goals set by professionals might not be entirely

internalized by their patients. Also it should be considered that treatment compliance is not consistent across behaviors, normally prescribed in case of diabetes (Coyle, Francis, & Chapman, 2013). For example, type 1 and type 2 diabetes patients have better compliance to medication and insulin administration, they also tend to attend clinic appointments regularly, however, patients suffer lack of compliance for healthy diet and exercise behavior (Soryte & Bulotaite, 2013).

Understanding the context explaining why some patients do engage in health related behavior, necessary to manage their condition, while others do not, is important for designing educational interventions which would target true causal mechanisms of behavior change and enhance health (Texeira et al., 2006; Butterworth, 2008). More specific question is what active components of educational intervention can be adapted in primary care. Literature review indicated that neither socio-demographic characteristics nor aspects of personality predicted treatment adherence, except the relatively uncommon states such as mental illness and temporary periods of stressful life events (e. g. recent divorce, loss of job (Schechter & Walker, 2002). So, other factors which would help identify target intervention groups and goals to be achieved should be examined.

After reviewing intervention programs for diabetes patients, authors concluded that in order to achieve better health-related outcomes, more than knowledge is needed (Norris, Engelgau, & Narayan, 2001). Since most of health-related behaviors such as physical activity, healthy diet and, in case of patients, medication use, are not enjoyable and self-motivated, so the quality of motivation seems to be the key element in behavior change efforts (Butterworth, 2008). Consequently, in case there is low motivation, enhancement it from outside becomes crucial. Research shows that communication with health care practitioners is related to better self-management behavior (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002) and it could be expected that the patient-practitioner relationship is the valuable source of motivation enhancement for behavior change as practitioners have both expertize and authority in the field (Ryan, Patrick, Deci, & Williams, 2008). Evidence suggests that Self-determination theory (SDT) is a viable conceptual framework to study antecedents and outcomes of motivation for health-related behaviors (Ng et al., 2012) as the theory includes perceived support as patient-practitioner relationship outcome which is an important contextual factor of health behavior.

Self-determination theory. Self-determination theory (SDT) is widely used as a framework in various fields to understand behavior. It is applied in education (Jõesaar, Hein, & Hagger, 2012), organization (Fernet, Austin, Trépanier, & Dussault, 2013), sport and exercise (Texeira, Carraça, Markland, Silva, & Ryan, 2012) and health care (Chan, Lonsdale, Ho, Yung, & Chan, 2009; Kusurkar, Croiset, Kruitwagen, & Cate, 2011).

SDT posits that all humans have an innate tendency towards growth and well-being regardless of race, gender, culture (Deci & Ryan, 2000) and health/disease status (Fortier, Sweet, Tulloch, Pipe, & Reid, 2012). SDT provides framework presenting not only motivation itself, but also process of motivation explaining health-related behavior. Theory distinguishes three main types of motivation and five types of behavior regulation which lay in the continuum from the least to the most self-determined. The least favorable for health is *amotivation*. Amotivated patients do not even bother to initiate health behavior. So, behavior regulation does not exist. They may think, for example, that it just a waste of time and not a valuable thing. So, in case of amotivation, there is no behavior regulation at all. Further, *controlled motivation* implies two types of behavior regulation. One of the controlled forms of motivation is *external regulation*, when behavior is performed under environmental pressures such as rewards, "musts" and "shoulds" or guilt for not doing. Patients follow their treatment recommendations because doctor, parents or spouse (significant others) would be angry or disappointed if they did not. Health care practitioners often trigger this type of behavior regulation by initiating patients' behavior change on the grounds of their authority. The other form of controlled motivation is *introjection* when a person behaves seeking acceptance, praise, or trying to avoid rejection, shame or guilt. This kind of behavior regulation covers more self-determined factors than in the case of external regulation, but is still initiated by environmental pressures. Both types of controlled behavior regulation are not related to long-term maintenance of health-related behavior (Ryan et al., 2008). Inwardly triggered or supported *autonomous motivation* implies self-initiated behavior. One of the three types of autonomous behavior regulation is *identified regulation*. The behavior is important to patients and integrated into their value system.

They may be involved in health behavior because they personally appreciate and understand the importance of behavior to remain healthy for a long time. Identified behavior regulation is enhanced by practitioners when they provide adequate treatment-related information, encourage genuine interest and personal meaning but do not control and do not make pressure to behave in a certain way. Further in the continuum lies *integrated regulation*. In this case, persons not only appreciate health-related behavior, but such behavior is consistent with their other values and lifestyle. Health practitioners encourage the integration supporting the patients when they face barriers in changing behavior, providing patterns of behavior and helping to make the informed choice (Ryan et al., 2008). Finally, intrinsic behavior regulation assumes free active engagement in behavior, which not necessarily has to be rewarded. The main condition intrinsically driven behavior be maintained is the satisfaction of basic human needs: autonomy, competence and relatedness (Deci & Ryan, 2000). When social environment supports these needs, the behavior is initiated voluntarily and consistently maintained (Julien, Senécal, & Guay, 2009).

On the other hand, SDT posits that motivation is a process where behavior regulation could change in the controlled – autonomous motivation continuum (Ryan & Deci, 2000). The most important factors contributing to the behavior regulation change is an expertise and autonomy support provided by health care practitioners (Ryan et al., 2008), which are probably ignored by a team of health professionals. Some patients are self-determined and adherent to treatment regimen, still most patients require assistance with motivation from their practitioners (Butterworth, 2008). Autonomy support is an important contextual patient-practitioner relationship factor, which, if is patient-centered, supports main human needs: autonomy, competence and relatedness, and enhance autonomous motivation for health related behavior (Williams, Frankel, Campbell, & Deci, 2000). The main goal of autonomy support is to encourage sincere interest for behavior and provide meaning to that behavior (Teixeira, Silva, Mata, Palmeira, & Markland, 2012). Autonomy support helps patient to make an informed choice (Williams, McGregor, Zeldman, Freedman, & Deci, 2004).

Therefore, reasons for treatment non-compliance are complex and among other motivational factors involve the social aspect – the patient and the health care practitioner interaction.

So, the **aim** of this study is to provide an overview of the research examining the relationship between contextual factor – autonomy support – and motivational process to control diabetes using self-determination theory as a guiding framework.

METHODS

In the present article an overview of published literature of applying SDT examining motivation and behavior in patients with diabetes was performed. *Sage, Medline* and *Google Scholar* data basis were searched using "autonomy support and diabetes" and "self-determination and diabetes" word combinations. Literature review included survey research and experimental studies. Among them were cross-sectional and longitudinal studies.

RESULTS

Research on SDT in diabetes shows that autonomy support is a prominent contextual variable in the chain of motivation – behavior – outcomes. Correlational analysis usually reveals an association of autonomy support with the main health behavior outcome in diabetes – glycemic index HbA1c (Williams, Freedman, Deci, 1998; Williams, King, Nelson, Glasgow, 2005; Williams, Lynch, Glasgow, 2007). However, direct relationship using higher level of statistical analysis, as a rule, failed to be confirmed (Williams et al., 1998). According to theory, autonomy support is not supposed to predict either behavior or behavioral outcomes directly, rather through mediator variables – autonomy and competence (Ryan et al., 2008). For example, an early study by Williams and colleagues (1998) confirmed that autonomy support did significantly predict reductions in HbA1c in patients with both types of diabetes using hierarchical multiple regression analysis, when only gender and diabetes-relevant clinical variables were included as control variables. Important finding was that both type 1 and type 2 diabetes patients, who experienced their practitioners as more supportive showed lower HbA1c index. Although when autonomy and competence were included in the equation, autonomy support and HbA1c relationship became insignificant. Meanwhile autonomy support enhanced autonomous motivation for diabetes management, which in turn increased perceived competence, and competence was related to reductions in HbA1c (Figure) (Williams et al., 1998).

Every overviewed study, except one (Julien et al., 2009), are in line with the theory and confirm the role of autonomy support as a proximate predictor of autonomous motivation for diabetes management. In regression analysis, perceived autonomy support increased autonomous motivation for diet behavior and the latter accounted for significant change in perceived competence (Figure) (Williams et al., 1998). Results of another study of Williams, Zeldman, Freedman and Deci (2004) indicated that perceived autonomy support from practitioners elevates autonomous motivation for diabetes related health behavior (diet, exercise, glucose testing) from baseline to 6 months. Deeper analysis of indirect relationships in this study revealed that the indirect relationship between perceived autonomy support and change in HbA1c (over a year) was significant, indicating that perceived autonomy support relates to change in HbA1c indirectly through changes in autonomous motivation and perceived competence. These relationships are indicated after the preliminary analysis showed that change in relative HbA1c over the year could not be predicted from the (a) demographic variables, (b) disease variables, and (c) treatment variables (Williams et al., 2004). One of the latest Williams, Patrick, and Niemiec's (2009) studies confirmed the positive relation of perceived autonomy support to autonomous motivation for medication use, which was further related to perceived competence for diabetes management. Perceived competence then associated with better perceived quality of life and medication adherence and the latter negatively affected non-HDL cholesterol (Figure) in structural equation model examining relations within SDT model of health behavior. Other research indicates the impact of autonomy support on both physical and psychological health. For example, Williams et al. (2005) using SEM analysis established direct relationships of autonomy support to perceived competence and patient satisfaction in type 2 diabetes patients. Indirect negative relationships were found between autonomy support and HbA1c through perceived competence and between autonomy support and depressive symptoms through patient satisfaction (Figure). So, patients who perceive more autonomy support from practitioners develop higher sense of competence which in turn enhances their engagement in treatment and improves mood.

Autonomy support is an important contextual variable in diabetes populations of different age. Moreover, research shows that for adolescent diabetes control autonomy support from multiple

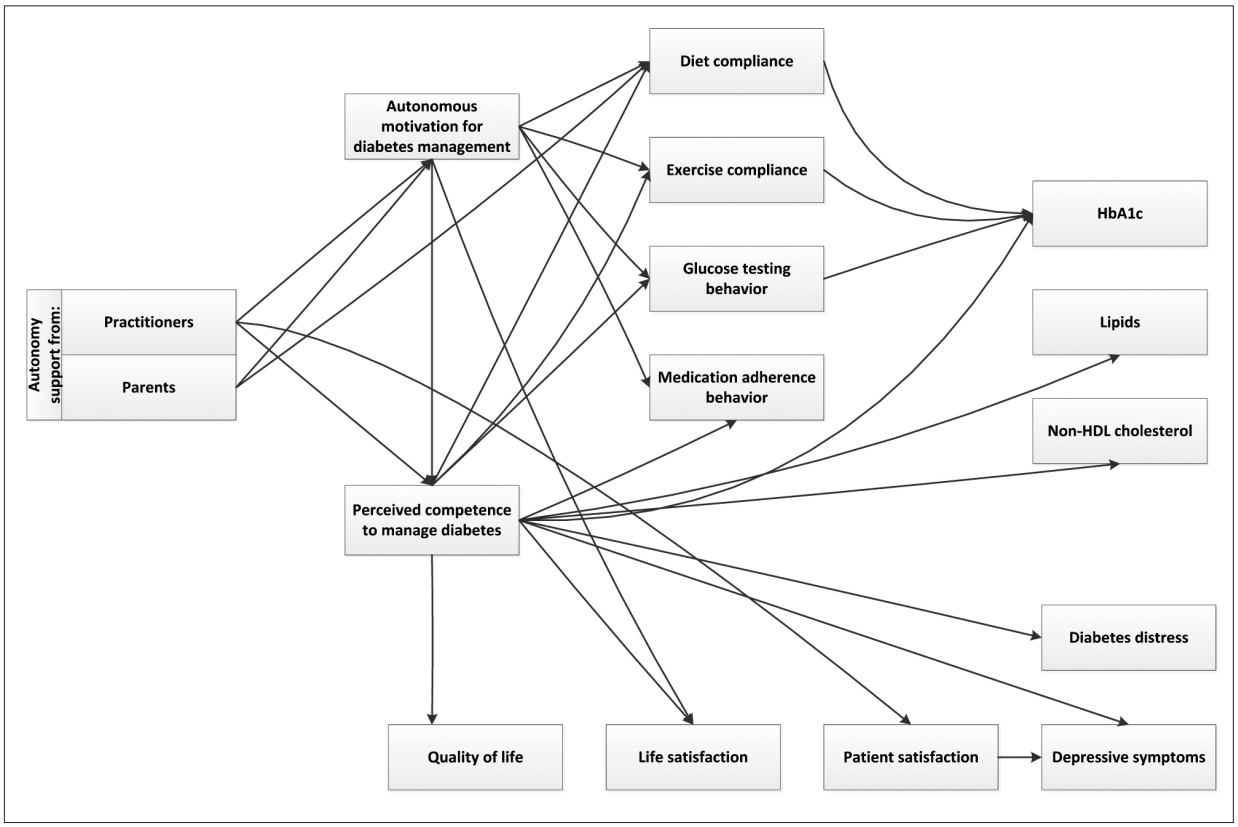

Figure. **Model of the relationship between autonomy support and motivational process of health behavior in patients with diabetes from self-determination theory perspective**

sources is crucial. In their study with a sample of adolescents with type 1 diabetes Austin, Senecal, Guay and Nouwen (2011) added evidence that autonomy support from both parents and practitioners enhanced adolescent autonomy for diet related behavior (Figure). Autonomy support from practitioners directly affected perceived competence and autonomous motivation, which in turn were related to dietary self-care in structural equation model. Also the more practitioners provide adolescents with choice and information, the more competent they feel about their dietary behavior. Autonomy support from parents was associated with autonomy and also directly related to dietary self-care (Figure). This direct relationship indicates that motivational factors do not fully account for the relationship between parental autonomy support and dietary self-care. The authors propose that autonomy support from parents – diet compliance direct relationship occurs because parents play an active role in meal planning.

However surprisingly in the cross-lagged longitudinal study, autonomy support at baseline was related to neither motivational factors as autonomous motivation, controlled motivation or amotivation nor diet behavior, after one year in type 2 diabetes adults, despite the fact that correlational analysis confirmed these relationships in the expected directions. Though in this study, active planning was reciprocally related to autonomous motivation, in turn, autonomous motivation at baseline was related to diet behavior in one year (Julien et al., 2009). This possibly indicates that including active planning, which already assumes self-determined actions, could diminish the effects of autonomy support on autonomous motivation in the motivation – behavior process model.

Some interventional studies tried to enhance perceived autonomy support and measure its impact on health behavior, health behavior mediators and outcomes in patients with diabetes. The results of these studies suggest that intervention focused on enhancing autonomy support should be planned carefully because not every technique proposed for autonomy support really works. For example, Williams et al. (2004) study shows that neither activation (when patients were helped to read their medical record and encouraged to ask questions and talk about their treatment with their physicians during a 20-minute session before their regularly scheduled visit) nor education (when American Diabetes Association videotape on diabetes care was played for 20 minutes) as intervention significantly changed perception of autonomy from practitioners. While, as it is mentioned above, perceptions of autonomy for diabetes management behavior and competence were promoted by perceived autonomy support and were the mediators between autonomy support and glycemic control (diet, exercise, glucose testing) (Figure) in structural equation model.

Meanwhile, interactive technologies widely used in health education also could serve as autonomy support providers. A randomized controlled trial involved adults with type 2 diabetes patients. Participants before scheduled visit completed a computerized touch screen assessment and action planning procedure. The program assessed and provided tailored feedback for self-management behaviors, choice of specific activities in the goal area, identified barriers and selected strategies to overcome the barriers. The patient got an individualized action plan, highlighting issues to discuss with the practitioner. Six months later, these procedures were repeated. This patient-centered intervention program which was directed to support patients' autonomy using information technologies demonstrated that higher perception of autonomy support enhanced perceived competence after six months, which in turn was associated with positive change in lipids, reduced diabetes distress and depressive symptoms at twelve months in SEM analysis (Figure) (Williams et al., 2007). Authors speculate that interactive programs which are used to asses patients' concerns and preferences and set further treatment goals, based on patients' choice, are not perceived by patients as controlling.

Summarizing previous studies it might be assumed that practitioners who take into consideration patients with diabetes perspectives, provide choice, justify the need for health-related behavior, discuss alternative treatment options, support patients' self-initiation, minimize use of controlling language and help patients build diabetes self-management skills may support patients' autonomy and competence. In accordance with SDT model applied for patients with diabetes, autonomy support instead of affecting directly the behavior or its outcome, affects patient's autonomy and competence and these factors trigger other changes in the motivation – behavior – outcome chain: treatment adherence, glycemic index and psychological health, which is also a very important health outcome.

CONCLUSIONS

Understanding diabetes management has changed a great deal in recent years. The important emphasis has been placed on the increased patient-centered or collaborative approaches to care and education instead of disease-centered approach. The patient-centered approach is based on a philosophy of empowerment (Mitchell Funnell, Tang, & Anderson, 2007). So it is essential that health care specialists pay greater attention to relationships with their patients. The self-determination model in diabetes represents a theoretical approach of understanding and predicting diabetes related health behavior and its outcomes. Autonomy support is included in it as important contextual factor. In accordance with SDT, it is crucial to support patients in a nonjudgmental manner, enhance patients' initial attempts to initiate or maintain the behavior in order to help them become more autonomous as patient-centered approach of care acknowledges the patients' experience, priorities and fears (Aujoulat, d'Hoore, & Deccache, 2007). Studies demonstrate that when health care practitioners are more patient-centered, patients tend to display more treatment compliance in contrast when health care practitioners are more physician-centered (Williams et al., 2000). This is in line with the results of this review which adds evidence that patient-practitioner relationship is a very important trigger for health behavior or its change. It was mostly confirmed in the SDT model applied for diabetes that contextual factor – autonomy support from practitioners – enhances autonomous motivation and competence (the latter directly or through autonomous motivation), which, in turn, are the mediators of diabetes related health behavior (glycemic control), its change and/or outcomes. However, research beyond the SDT also indicates that the patient's subjective assessment of the practitioner-patient relationship is associated with the HbA1c values, independently of type of diabetes (Rose, Fliege, Hildebrandt, Schirop, & Klapp, 2002). Similar findings were among patients with coronary artery disease. Autonomy support from practitioners predicted autonomous motivation, which in turn predicted improved diet and more exercise in these patients (Williams et al., 2005). Perceived autonomy support also increased autonomous motivation to methadone treatment adherence (Zeldman, Ryan, & Fiscella, 2004). Other research in patients with depression states that even though patients tend to participate in treatment more when they perceive autonomy support from practitioners, anyway autonomous motivation seems to be the key determinant to predict health-related behavior (Zuroff et al., 2007). Some evidence from current review even suggests that autonomy support fails to predict autonomous motivation when supposedly a more prominent active planning factor is included. Active planning enhances autonomous motivation and vice versa (Julien et al., 2009).

It should be noted that research mostly investigates the quality of motivation for diabetes management behavior in general or medication adherence and diet in particular. There is some lack of information in reviewed literature regarding motivation for physical activity. Taking in mind that diabetes related behavior compliance is not consistent across behaviors (Coyle et al., 2013; Soryte & Bulotaite, 2013) firstly, it is really important to differentiate motivation quality for each type of diabetes related health behavior. Secondly, research shows that physical activity in patients with diabetes is usually lower than recommended (Plotnikoff, 2006), although both aerobic and resistance training is beneficial in improving glucose homeostasis, psychological state, reduced rates of death from any cause and from diabetes in particular (Warburton, Whitney, Nicol, & Bredin 2006), too little importance is placed on exercise motivation research in the framework of SDT in this clinical group.

Theoretical approach and empirical evidence from different research areas suggest that autonomy support is a modifiable factor; it could be taught and learned (Su & Reeve, 2011). However there is a gap in endeavor to enhance autonomous motivation during educational programs based on SDT. These results implicate further experimental research trying to find the key techniques which would be capable to induce perceived autonomy support. Recently, research found that combining SDT framework and motivational interviewing practice could complement each other in promoting behavior change (Markland, Ryan, Tobin, & Rollnick, 2005). Motivational interviewing seems to be the solution of patient education and counseling problem. Experimental study shows that patients who receive motivational interviewing were significantly more autonomously motivated to control their diabetes than patients who did not receive MI (Rubak, Sandbæk, Lauritzen, Borch-Johnsen, & Christensen, 2009). This further leads to practical implication and helps to explain

human motivation for health behavior within the framework of SDT. Identification of significant relations of autonomy support also provides basis for enhancing health care in patients with diabetes. In turn, minimization of long-term diabetes complications, enhanced psychological health and quality of life could be expected if health professionals provide autonomy support.

In summary, it may be concluded that interrelationship between contextual social, inner psychological and physiological factors is crucial to consider the content of educational programs of diabetes care. Educating practitioners to be more autonomy supportive would lead to more autonomously motivated patients and, consequently, better glycemic control. Looking more globally, results also imply that a multidisciplinary team of professionals (endocrinologists, general practitioners, nurses, dieticians, physiotherapists, health psychologist), trained to work with patients with diabetes, is required to develop, implement and supervise those educational programs.

REFERENCES

Aujoulat, I., d'Hoore, W., & Deccache, A. (2007). Patient empowerment in theory and practice: Polysemy or cacophony? *Patient Education and Counseling*, 66(1), 13–20. doi:10.1016/j.pec.2006.09.008

Austin, S., Senecal, C., Guay, F., & Nouwen, A. (2011). Effects of gender, age, and diabetes duration on dietary self-care in adolescents with type 1 diabetes: A Self-Determination Theory perspective. *Journal of Health Psychology*, 16, 917–928. doi: 10.1177/1359105310396392

Butterworth, S. (2008). Influencing patient adherence to treatment guidelines. *Supplement to Journal of Managed Care Pharmacy,* 14(6), 21–25.

Chan, D. K., Lonsdale, C., Ho, P. Y., Yung, P. S. H., & Chan, K. M. (2009). Patient motivation and adherence to post-surgery rehabilitation exercise recommendations: The influence of physiotherapists' autonomy supportive behaviors. *Archives of Physical Medicine & Rehabilitation*, 90, 1977–1982. doi: 10.1016/j.apmr.2009.05.024

Coyle, M. E., Francis, K., & Chapman, Y. (2013). Self-management activities in diabetes care: a systematic review. *Australian Health Review,* 37(4), 513–522. doi: 10.1071/AH13060

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry,* 11(4), 227–268. doi:10.1207/S15327965PLI1104_01

Fernet, C., Austin, S., Trépanier, S. G., & Dussault, M. (2013). How do job characteristics contribute to burnout? Exploring the distinct mediating roles of perceived autonomy, competence, and relatedness. *European Journal of Work and Organizational Psychology*, 22, 123–137. doi.org/10.1080/1359432X.2011.632161

Fortier, M. S., Sweet, S. N., Tulloch, H., Pipe, A. L., & Reid, R. D. (2012). Self-determination and exercise stages of change: Results from the Diabetes Aerobic and Resistance Exercise Trial. *Journal of Health Psychology,* 17(1), 87–99. doi: 10.1177/1359105311408948

Girach, A., Manner, D., & Porta, M. (2006). Diabetic microvascular complications: Can patients at risk be identified? A review. *International Journal of Clinical Practice,* 60(11), 1471–1483. doi: 10.1111/j.1742-1241.2006.01175.x

Heisler, M., Bouknight, R. R., Hayward, R. A., Smith, D. M., & Kerr, E. A. (2002). The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. *Journal of General Internal Medicine*, 17(4), 243–252. doi: 10.1046/j.1525-1497.2002.10905.x

Jõesaar, H., Hein, V., & Hagger, M. S. (2012). Youth athletes' perception of autonomy support from the coach, peer motivational climate and intrinsic motivation in sport setting: One-year effects. *Psychology of Sport and Exercise,* 13, 257–262. doi.org/10.1016/j.psychsport.2011.12.001

Julien, E., Senécal, C., & Guay, F. (2009). Longitudinal relations among perceived autonomy support from health care practitioners, motivation, coping strategies and dietary compliance in a sample of adults with type 2 diabetes. *Journal of Health Psychology,* 14(3), 457–470. doi: 10.1177/1359105309102202

King, D. K., Glasgow, R. E., Toobert, D. J., Strycker, L. A., & Estabrooks, P. A. (2010). Self-Efficacy, problem solving, and social-environmental support are associated with diabetes self-management behaviors. *Diabetes Care,* 33, 751–753. doi: 10.2337/dc09-1746. Epub 2010 Feb 11

Kusurkar, R., Croiset, G., Kruitwagen, C., & Cate, O. (2011). Validity evidence for the measurement of the strength of motivation for medical school. *Advances in Health Science Education*, 16, 183–195. doi: 10.1007/s10459-010-9253-4

Markland, D., Ryan, R., Tobin, V., & Rollnick, S. (2005). Motivational interviewing and self-determination theory. *Journal of Social & Clinical Psychology*, 24, 811–831.

Mitchell Funnell, M., Tang, T. S., & Anderson, R. M. (2007). From DSME to DSMS: Developing empowerment-based diabetes self-management support. *Diabetes Spectrum,* 20(4), 221–226. doi: 10.2337/diaspect.20.4.221

Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-Determination Theory applied to health

contexts: A meta-analysis. *Perspectives on Psychological Science*, 7, 325–340. doi: 10.1177/1745691612447309

Norris, S. L., Engelgau, M. M., & Narayan, K. M. V. (2001). Effectiveness of self management training in type 2 diabetes. *Diabetes Care,* 24, 561–587. doi: 10.2337/diacare.24.3.561

Plotnikoff, R. C. (2006). Physical activity in the management of diabetes: population-based perspectives and strategies. *Canadian Journal of Diabetes*, 30(1), 52–62. doi:10.1016/S1499-2671(06)01009-4

Rose, M., Fliege, H., Hildebrandt, M., Schirop, T., & Klapp, B. F. (2002). The network of psychological variables in patients with diabetes and their importance for quality of life and metabolic control. *Diabetes Care*, 25, 35–42. doi: 10.2337/diacare.25.1.35

Rubak, S., Sandbæk, A., Lauritzen, T., Borch-Johnsen, K., & Christensen, B. (2009). General practitioners trained in motivational interviewing can positively affect the attitude to behaviour change in people with type 2 diabetes. *Scandinavian Journal of Primary Health Care*, 27, 172–179. doi: 10.1080/02813430903072876

Rubin, R. R., & Peyrot, M. (2001). Psychological issues and treatments for people with diabetes. *Journal of Clinical Psychology,* 57(4), 457–478. doi: 10.1002/jclp.1041

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on Self-Determination Theory. *The European Health Psychologist*, 10, 2–5.

Schechter, C. B., & Walker, E. A. (2002). Improving Adherence to Diabetes Self-Management Recommendations. *Diabetes Spectrum,* 15(3), 170–175. doi: 10.2337/diaspect.15.3.170

Soryte, D., & Bulotaite, L. (2013). Illness perception and adherence to treatment in patients with type 1 and type 2 diabetes mellitus. *Visuomenes sveikata [Public health],* 2(61), 63–71.

Su, Y. L, & Reeve, J. (2011). A Meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review*, 23, 159–188. doi: 10.1007/s10648-010-9142-7

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. S., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity,* 9, 78. doi:10.1186/1479-5868-9-78

Teixeira, P. J., Going, S. B., Houtkooper, L. B., Cussler, E. C., Metcalfe, L. L., Blew, R. M., & Sardinha, L. B. (2006). Exercise motivation, eating, and body image variables as predictors of weight control. *Medicine and Science in Sports and Exercise*, 38, 179–188. doi: 10.1249/01.mss.0000180906.10445.8d

Teixeira, P. J., Silva, M. S., Mata, J., Palmeira, A. L., & Markland, D. A. (2012). Motivation, self-determination, and long-term weight control. *International Journal of Behavioral Nutrition and Physical Activity,* 9, 1–13. doi:10.1186/1479-5868-9-22

Warburton, D. E. R., Whitney Nicol, C., & Bredin, S. S. D. (2006). Health benefits of physical activity: The evidence. *CMAJ*, 174(6), 801–809. doi: 10.1503/cmaj.051351

Williams, G. C., Frankel, R., Campbell, T. L., & Deci, E. L. (2000). Research on relationship-centered care and health-care outcomes from the Rochester biopsychosocial program: A self-determination theory integration. *Families, Systems & Health,* 18, 79–90. doi: 10.1037/h0091854

Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate glucose control in patients with diabetes. *Diabetes Care*, 21, 1644–1651. doi: 10.2337/diacare.21.10.1644

Williams, G. C., Gagné, M., Mushlin, A. I., & Deci, E. L. (2005). Motivation for behavior change in patients with chest pain. *Health Education*, 105, 304–321. doi: 10.1108/09654280510602516

Williams, G. C., King, D., Nelson, C. C., & Glasgow, R. E. (2005). Variation in perceived competence, glycemic control, and patient satisfaction: Relationship to autonomy support from physicians. *Patient Education and Counseling*, 57, 39–45. doi:10.1016/j.pec.2004.04.001

Williams, G. C., Lynch, M. F., & Glasgow, R. E. (2007). Computer-assisted intervention improves patient-centered diabetes care by increasing autonomy support. *Health Psychology*, 26, 728–734. doi: 10.1037/0278-6133.26.6.728

Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a self-determination theory process model for promoting glycemic control through diabetes self-management. Health Psychology, 23, 58–66. doi: 10.1037/0278-6133.23.1.58

Williams, G. C., Patrick, H., Niemiec, C. P. (2009). Reducing the health risks of diabetes: How self-determination theory may help improve medication adherence and quality of life. *The Diabetes Educator*, *35*, 484-492. doi: 10.1177/0145721709333856

Zeldman, A., Ryan, R. M., & Fiscella, K. (2004). Motivation, autonomy support and entity beliefs: Their role in methadone maintenance treatment. *Journal of Social and Clinical Psychology*, 23, 675–696. doi: 10.1521/jscp.23.5.675.50744

Zuroff, D. C., Koestner, R., Moskowitz, D. S., Mcbridez, C., Marshall, M., & Bagby, M. (2007). Autonomous motivation for therapy: A new common factor in brief treatments for depression. *Psychotherapy Research*, 17, l37–148. doi:10.1080/10503300600919380

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