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General

Relationship Between Psychological Needs and Regulatory Focus Among Adults with Type 2 Diabetes

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Background

Diabetes is a chronic disease. A sustained change in lifestyle is generally necessary for terms of diet and physical activity. According to Self-Determination Theory, the nature of the motivation to regulate one's behavior is linked to the satisfaction of three psychological needs: autonomy, competence, and relatedness. According to Regulatory Focus Theory, there is a promotion focus and a prevention focus. The prevention focus has been shown to have a different relationship with the satisfaction of the needs of the Self-Determination Theory between a general population and a population with health problems.

Objective

This study investigates the relationship between psychological needs and regulatory focus for people with type 2 diabetes (T2D).

Methods

295 adults with T2D completed an online questionnaire measuring autonomy and perceived competence and regulatory focus.

Results

The promotion focus predicts the satisfaction of needs for autonomy and competence ($\beta = 1.50, p < .01$). The prevention focuses positively predicts the satisfaction of autonomy and competence needs ($\beta = 2.06, p < .001$).

Conclusion

These factors display different relationships between them among people with type 2 diabetes compared to the general population. Prevention focus seems to be more beneficial in the specific context of T2D than in the general population.

I. INTRODUCTION

Diabetes is a chronic disease, which the World Health Organization (WHO, www.who.int/topics/chronic_diseases/en/) defines as “a long-term condition that usually progresses slowly”. Type 2 diabetes usually develops in adulthood. It is characterized by a high level of sugar in the blood due to resistance to insulin, which is a hormone that helps the body absorb glucose from the blood. Certain aspects of physical activity, through its impact on excess fat mass, represent a first risk factor for type 2 diabetes. Regular physical activity reduces the risk of diabetes and hyperglycaemia. Physical

activity is defined by the WHO as “any movement produced by skeletal muscles that is responsible for an increase in energy expenditure” (<https://www.who.int/dietphysicalactivity/pa/fr/>). The literature review by Duclos and colleagues shows that physical activity is beneficial in diabetes with a decrease in blood glucose levels.¹ This decrease is due to an increase in glucose consumption by the muscles that have been exercised up to 7 hours after stopping the activity. Therefore, to maintain a blood glucose level that limits the risk of complications, a change in lifestyle is often necessary for terms of physical activity.

Self-Determination Theory (SDT) has already been used to develop health interventions for people with type 2 dia-

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betes.²⁻⁴ According to this theory, the nature of the motivation to regulate one's behavior is linked to the satisfaction of three psychological needs: autonomy, competence, and relatedness.⁵ In other words, the more an individual's basic needs are met in a given area (e.g., health), the more that individual will develop behaviors that are in line with his or her own values (e.g., being physically active because it makes him or her feel good). We are interested in the factors that can influence the satisfaction of two of these three needs (autonomy and competence), specifically in the context of type 2 diabetes. The need for relatedness presents mixed results in relation to physical activity because some activities are naturally practiced alone.⁶ In addition, conducting experimental studies about relatedness raises difficulties in terms of setup. Therefore, this need was not considered in this study.

According to Deci and Ryan, an individual's personality influences the satisfaction of his or her psychological needs.⁷ For this reason, we are considering personality and its possible relationship with the satisfaction of needs.

Regulatory Focus Theory (RFT) is a theory of personality that is relevant to our study because it is said to be related to SDT.⁸⁻¹¹ However, to our knowledge, RFT has been little studied in the specific context of diabetes despite numerous studies involving RFT in the health field.¹²⁻¹⁸ None of these studies examined the relationship between SDT and RFT.

Higgins developed RFT in which he defines two basic needs inherent to every human being: a need for fulfillment and a need for security.⁸ Each person will favor one or the other of these needs according to context and her personality and set up an adopted regulation. The *promotion focus* is self-regulation which responds to the need for nurturance and the *prevention focus* is self-regulation which response to the need for security. Different goals and strategies will be set up according to the type of focus. In the case of a promotion focus, the initial state is seen as a negative situation of no gain and the objective is to obtain again. In the case of a prevention focus, the initial state is seen as a positive no-loss situation and the objective is to maintain this state and avoid deterioration.¹⁹

Recently, researchers have explored the relationship between SDT and RFT.⁹⁻¹¹ Laroche and colleagues highlighted the fact that the relationship between RFT and the amount of physical activity is mediated by the different types of motivation described in SDT.¹⁰ Vaughn observed that there is a relationship between the feeling of competence and autonomy related to a past event and the labeling of this event as meeting a promotion or prevention goal.¹¹ Participants were asked to recall certain past events. They were then asked to provide information on the level of autonomy and competence they felt about this event and to classify each event as meeting a promotion goal (i.e., aiming to achieve an ideal) or meeting a prevention goal (i.e., aiming to fulfill one's duties). When participants reported a higher perceived level of autonomy and competence, they were more likely to label the goal related to that event as a promotional goal. Conversely, when participants reported a lower level of perceived autonomy and competence during the event, they were more likely to label the goal of the event as a prevention goal. Vaughn also tested the relationship in the opposite direction.¹¹ To do this, a promotion or



Figure 1. Tested model of the relationships between RFT and autonomy and competence satisfaction.

The red line represents a negative relationship between the two variables. The green line represents a positive relationship between the two variables. Yellow squares refer to RFT. Violet square refers to autonomy and perceived competence.

prevention focus was induced in participants using instruction for an attention task (earn a bonus of \$0.30 or keep a bonus of \$0.30). Following completion of the task, participants were asked to determine the level of autonomy and competence they felt. When a promotion focus was induced (earn a bonus), participants reported a higher level of autonomy and competence than when a prevention focus was induced (keep a bonus). In addition, Lalot and colleagues tested the impact of prevention-oriented or promotion-oriented messages for balanced eating among students according to their intrinsic and extrinsic motivation levels.⁹ The results showed that the higher the level of extrinsic motivation, the higher the intention to eat a balanced diet following a prevention-oriented message. On the other hand, the level of intention to eat a balanced diet following a promotion-oriented message was not affected by the level of motivation, whether intrinsic or extrinsic.

These results suggest that individuals with a promotion focus would be less sensitive to external elements to modify their behavior. Those with a prevention focus would be more sensitive to external factors when it comes to changing their behavior. However, these studies were based on an induced focus. It is possible that the impact of induced focus is tempered or reinforced by an individual's chronic focus, depending on whether the two are similar. For this reason, it is interesting to look at chronic focus.

The goal of our study is to explore the relationship that may exist between the satisfaction of needs (autonomy and competence) and the RFT in the specific context of type 2 diabetes to promote physical activity.

We, therefore, propose the following hypotheses which are based on the above-mentioned studies:

Our first hypothesis H1 is that the higher the promotion focus, the higher the satisfaction of the needs for autonomy and competence.

Our second hypothesis H2 is that the higher the prevention focus, the lower the satisfaction of the needs for autonomy and competence.

Based on these two hypotheses, we propose a model representing these different relationships (Figure 1).

Table 1. Characteristics of participants.

n = 295		Mean	Standard deviation
Time since diagnosis		10.98	7.77
Oral treatment		259 (87.8%)	
Treatment by injection		63 (21.4%)	
No treatment		11 (3.7%)	
Gender		125 (42.4%) F and 1 (0.3%) Other	
Age		60.93	11.69
Level of education	Elementary school	1 (0.3%)	
	Middle school	41 (13.9%)	
	High School	132 (44.7%)	
	Bac +2	5 (1.7%)	
	Bachelor level	67 (22.7%)	
	Master level	37 (12.5%)	
Doctorate		12 (4.1%)	
Body Mass Index		30.26	14.04

II. MATERIALS AND METHODS

1. ETHICAL CONSIDERATIONS

The study was approved by a Research Ethics Committee (Comité d'Ethique de la Recherche) of Paris Saclay University (study approval number: 186). Consent was obtained from participants by electronic validation on a written form. Data are anonymized and stored on a protected server.

2. PARTICIPANTS

To be eligible for this study, participants had to have been diagnosed with type 2 diabetes for at least one year and live in France. Of the 387 completed questionnaires, 70 were removed because they did not meet these criteria. In addition, 22 completed questionnaires were deleted because the total response time was less than more than one standard deviation from the mean (less than 6 minutes 40). Therefore, 295 questionnaires were eventually included in the analyses (72.3% of the questionnaires that were launched).

The characteristics of the 295 participants are provided in [Table 1](#). The sample includes 125 women (42.4%), 169 men (57.3%), and 1 other person (0.3%). The mean age is 61 years with a standard deviation of 12 years. On average, participants have been diagnosed with type 2 diabetes for 11 years with a standard deviation of 8 years. In terms of treatment, 259 (87.8%) received at least one oral treatment, 63 (21.4%) received at least one type of injection, and 11 (3.7%) received no treatment. The mean BMI value is 30.26 with a standard deviation of 14.04. 121 participants (41.02%) had attended post-secondary education.

3. PROCEDURE

Data were collected in July 2020 via a cross-sectional online self-report survey. Participants were recruited via a national

online research panel (Dynata, <https://www.dynata.com>, ISO 20252:2019). Participants were invited by email to participate in an online study. By clicking on the hyperlink provided in the email, they were directed to a secure webpage. The company Dynata in charge of recruiting our participants did not have access to any data collected during this study. By accessing the survey on our laboratory server, participants were informed of the objectives of the study. They were provided with general information on the content of the questions. Following this information, the consent form was presented. The content of the survey (information, instructions, questions) was identical for all participants, but the order of the different questionnaires was randomized across participants. Only the additional data was systematically filled in last. Participants received rewards from Dynata in the form of vouchers or loyalty points. The rewards are not of the same nature depending on the programs in which the participants are enrolled, but they are of the same value.

4. MEASURES

SDT

We measured the *satisfaction of the need for autonomy* in diabetes using the Health Care Climate Questionnaire (HCCQ). It is a questionnaire with 6 items ranging from 1 to 7 to assess support for autonomy from the health practitioners who follow the person. This questionnaire can be used regardless of the health problem being studied. The score ranges from 6 to 42. The higher the score, the more the individual considers that his or her health practitioners support his or her autonomy.

The *perceived competence* in coping with diabetes is measured by the Diabetes Empowerment Scale Short Form (DES-SF).²⁰ It consists of 8 items ranging from 1 (strongly

disagree) to 5 (strongly agree). The total score ranges from 1 to 5 (average of all items).

REGULATORY FOCUS

Regulatory Focus is measured with the Regulatory Focus Strategies Scale (RFSS).²¹ It is a scale with 14 items ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). 6 items measure the prevention focus and 8 items measure the promotion focus. The score for each focus is the average of the items measuring it and ranges from 1 to 7.

ADDITIONAL DATA

Several additional data were provided: how long participants have had diabetes, the type of diabetes treatment they have, their age, their height and weight (for the Body Mass Index), their level of education, and their gender.

5. STATISTICAL ANALYSIS

Analyses were performed with R 4.0.2. A Shapiro-Wilk test was performed on the questionnaire data and no variable had data with a normal distribution. For this reason, non-parametric tests were used. The Lavaan package was used to build structural equation models (SEM) with Maximum Likelihood (ML) estimation and Wishart functionality. The Full Information Maximum Likelihood function was used to manage missing data. Studies have shown that age, gender, BMI, and time since diabetes diagnosis can have an impact on regulatory focus, motivation, or emotional regulation.^{22–24} They were therefore controlled in the SEM. The structural model was established to test our hypotheses (H1, H2). In order to assess the model fit, we reported CFI (comparative fit index) and SRMR (the standardized root mean square residual).

III. RESULTS

1. DESCRIPTIVE STATISTICS

Descriptive statistics are presented in [Table 2](#).

SDT

The mean on the HCCQ-SF questionnaire in our sample is 30.87 out of 42 and a standard deviation of 7.85. Barello and colleagues in their study of more than 1,000 people with various chronic diseases (cardiovascular disease, autoimmune disease, cancer, diabetes, migraine ...) obtained a mean HCCQ score of 29.22 with a standard deviation of 9.49.²⁵ Our results are similar to those of Barello and colleagues.²⁵

The mean on the DES-SF questionnaire for our sample is 3.73 out of 5 with a standard deviation of 0.58. In the report by Zuercher and colleagues on over 300 participants with diabetes, 84% of whom were type 2 diabetes, the mean DES-SF score was 4 out of 5.²⁶ These results are relatively close to those of Zuercher and colleagues.²⁶

Table 2. Descriptive statistics.

n = 295	Mean	Standard deviation
HCCQ-SF* (satisfaction of the need for autonomy)	30.87	7.85
DES-SF** (satisfaction of the need for competence)	3.73	0.58
RFSS Promotion ***	4.95	0.81
RFSS Prevention ***	4.97	0.85

* Score on the Health Care Climate Questionnaire Short Form, the score can range from 6 to 42. ** Score on the Diabetes Empowerment Scale Short Form, the score can range from 1 to 5. *** 2 sub-scores of the Regulatory Focus Strategies Scale, scores can range from 1 to 7.

REGULATORY FOCUS

The mean for the promotion score is 4.95 out of 7 with a standard deviation of 0.81 and the mean for the prevention score is 4.97 out of 7 with a standard deviation of 0.85. Both foci are significantly correlated at .39 with $p < .001$. The correlation between the two foci is also found in the study by Laroche and colleagues with a significant correlation of .51 with $p < .001$ between the two foci measured by the Health Regulatory Focus.^{10,27}

2. STRUCTURAL MODEL

To test the relationships between the different variables, a SEM was constructed and tested. The fit of the model is good: CFI = .98, SRMR = .022.²⁸

The promotion focus predicts the satisfaction of needs for autonomy and competence ($\beta = 1.50$, $p < .01$). This result supports the H1 hypothesis that the promotion focus positively predicts the satisfaction of autonomy and competence needs. The H1 hypothesis is validated. The prevention focus positively predicts the satisfaction of autonomy and competence needs ($\beta = 2.06$, $p < .001$). This result does not support the H2 hypothesis according to which the prevention focus negatively predicts the satisfaction of needs for autonomy and competence, and is even the opposite of this hypothesis. The H2 hypothesis is not validated.

IV. DISCUSSION

1. HYPOTHESES

The objective of this study is to investigate the relationships between the satisfaction of autonomy and perceived competence and regulatory focus in the specific context of type 2 diabetes. The results show that the promotion positively predicts the satisfaction of autonomy and competence needs in the context of type 2 diabetes. This result validates our H1 hypothesis. This result is similar to that obtained by Vaughn in the general population.¹¹

The results show a positive relationship between the prevention focus and the satisfaction of autonomy and competence needs in type 2 diabetes, which is contrary to the expected direction of this relationship. This result does not validate our H2 hypothesis. This result differs from the results observed by Vaughn in a general population, which

showed that the prevention focus induced or linked to a situation was associated with a decrease in feelings of autonomy and competence.¹¹ Knowing that a focus can be induced by a specific situation, the difference in the relationship we observe may be due to the particular situation of type 2 diabetes self-management, since the situational focus has an impact independent of the chronic focus, even when there is a discrepancy between the two.^{29,30} Furthermore, it has been determined that an individual's chronic focus develops during childhood through interactions with those around him or her.⁸ However, the health-related focus only develops in adulthood and is independent of the chronic focus.²⁷ According to Berezowska and colleagues, the promotion focus would be linked to a higher behavioral intention towards health elements of a fairly distant future, whereas the prevention focus would be linked to present health.³¹ Immediate and distant health are closely related in the context of type 2 diabetes since glycemic control representing immediate health is necessary for future health and to avoid complications.³² There would also be a relationship between an individual's focus and the type of behaviors that he or she implements. According to Avraham and colleagues, lifestyle behaviors such as eating and physical activity are more likely to be promotional behaviors, while behaviors related to blood glucose testing or foot care are more likely to be medical behaviors and more likely to be preventive.¹² According to their study, it would be easier to implement behaviors that respond to the strategy associated with the chronic focus. However, they used a general measurement scale for regulatory focus and it might be interesting to study whether the same results are found using a health-specific measurement scale such as the Gomez and colleagues scale.²⁷

2. LIMITATIONS AND FUTURE DIRECTIONS

One of the limitations of this study is that the questionnaires were all filled out at the same time and do not allow us to judge the influence of one determinant on another over time. It would be interesting to carry out several measurements in order to evaluate the evolution over time of the different variables. It would thus be possible to determine the existence of a causal link between these different variables.

It would also be interesting to carry out a study with a sample of the general population and a sample of individuals with type 2 diabetes to observe these differences in more detail. It would also be interesting to see if the measurement of health focus allows similar results to be observed.

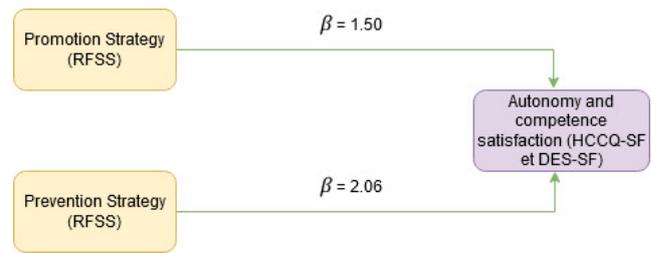


Figure 2. Significant relationships in the model tested.

Green lines indicate a positive relationship. Yellow squares refer to RFT. Violet square refers to SDT.

V. CONCLUSION

The study described in this article brings new insight into the relationships between the satisfaction of needs and regulatory focus in the specific setting of type 2 diabetes.

The regulatory focus appears to have a different relationship to psychological needs' satisfaction in type 2 diabetes than in a general population. In this context, the prevention focus seems to be more beneficial for participants with diabetes than for the general population. This result complements the studies that have shown a link between certain personality traits and glycemic control for people with diabetes.^{33,34}

AUTHORS' CONTRIBUTIONS

MA, CC, and JCM contributed to the conception and design of the study. MA organized the database, performed the statistical analysis, and wrote the first draft of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version. The guarantors are JCM and CC.

CONFLICT OF INTEREST

We have no known conflict of interest to disclose.

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