

Psychological empowerment and quality of life in haematopoietic stem cell transplantation patients: A quantitative study

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Abstract

Aim: This study aimed to evaluate the relationship between psychological empowerment, depression, anxiety, and quality of life in people with haematopoietic stem cell transplantation (HSCT).

Design: A longitudinal prospective study.

Methods: A sample of 150 people with haematological was recruited at Santaros Clinics in Lithuania between September 2020 and April 2022. Demographic characteristics, cancer-related characteristics, depression, anxiety, psychological empowerment and quality of life (QoL) were assessed using self-report questionnaires before and 10–12 weeks after HSCT. Descriptive statistics, correlation and moderation analyses were performed.

Results: The results showed that psychological empowerment had a significant correlation with patients' depression, anxiety and QoL. Patients who were more empowered before HSCT had a subjectively better QoL before and after HSCT and were less depressed after transplantation. The results showed that empowerment was a moderator between depression and QoL after transplantation, but it had a significant effect on the QoL only among patients who are less depressed.

Patient or public contribution: With this study, we aim to contribute to a better understanding of the psychological experiences of people with HSCT. Particularly, psychological empowerment is an important factor in preparing for this treatment. Medical professionals like nurses can be crucial contributors to implementing and strengthening psychological empowerment.

KEYWORDS

anxiety, depression, haemopoietic stem cell transplantation, nurse roles, quality of life

1 | INTRODUCTION

The treatment of oncoheamatological diseases involves the administration of high cytotoxic chemotherapy doses, usually followed by haematopoietic stem cell transplantation (HSCT). HSCT is an extremely invasive and aggressive treatment approach associated with high levels of therapy-related morbidity and mortality (Dufour, 2019; Passweg et al., 2016; Pidala et al., 2009). Even though people with HSCT live longer nowadays, a large number of these patients have a poor quality of life (QoL) due to various physical and psychological complications caused by both the disease and the treatment. The patients' QoL after transplantation is primarily related to their physical and functional condition (Liang et al., 2018a). Patients' health-related QoL post-HSCT is less satisfactory in many aspects, not only physical but also functional, psychological and social (Danhauer et al., 2013; Devins et al., 2018; El-Jawahri et al., 2015; Islam, 2018).

In psycho-oncology, QoL is defined as a dynamic, multifaceted construct that includes physical, cognitive, emotional, and social functioning and well-being (Devins et al., 2018; O'Sullivan et al., 2018; Pidala et al., 2009). In recent years, the QoL of HSCT recipients has been widely studied (Danhauer et al., 2013; Devins et al., 2018; El-Jawahri et al., 2015; Islam, 2018; Seo et al., 2019) and according to data from different studies, patients' QoL after HSCT is less satisfactory in many dimensions compared with survivors of other cancers.

Research shows that people with HSCT experience many psychological difficulties: sleep disorders, distress, anxiety, tension, depression, agitation, apathy, sometimes hallucinations and delirium (El-Jawahri et al., 2015; Nakamura et al., 2019; Seo et al., 2019). According to the study by El-Jawahri et al. (2017), pre-transplant depression was associated with shorter overall survival after HSCT and a higher risk of complications. This observation has also been confirmed by several other research studies (Devins et al., 2018; Jim et al., 2016; Liang et al., 2018a; Park et al., 2019; Seo et al., 2019), which concluded that depression in people with HSCT is a predictor of shorter survival, lower QoL and development of various physical complications.

Although there is considerable research into HSCT and its impact on patients' lives and emotional well-being, there is not much data to help understand the mechanisms and psychological factors that could improve patients' QoL both during treatment and after HSCT. This is an important issue not only in theory but also in practice.

For patients and medical staff, the decision to opt for HSCT is not an easy one, as it requires a huge effort on both sides. The patient spends between 5 and 14 weeks in an isolation ward in the hospital, has to go to the hospital for a long period of time after discharge for follow-up tests, and has to be admitted to the hospital at least several times due to deterioration of physical well-being (due to prolonged immunosuppression and infections, post-transplant complications, graft-versus-host disease) and has to be hospitalized again, all of which takes time, perseverance and support. Nurses play a crucial role within the multidisciplinary team caring for patients undergoing this intense treatment. Nurses are an advocate

throughout the transplant and often act as a motivating force, supporting and, advising and supplying physical, psychological and emotional care whilst patient's transition from acute care to long-term follow-up clinics. Experienced nurses with high levels of technical competencies offer patients and families excellent care and support in this challenging area (Poloméni et al., 2020). Understanding and responding to patients' emotional experiences is one of the most basic skills nurses have. It is, therefore important to be aware of the mechanisms and psychological factors that can help patients to cope with this complex treatment.

1.1 | Background

H. Livneh proposed a conceptual model of psychosocial adaptation in the context of chronic diseases and disability, which potentially explains the factors that influence QoL in patients with a diagnosis of a serious illness. The adaptation is interpreted as the interaction of three interrelated factors: *antecedents* of a significant event (e.g., a diagnosis of an oncological disease), the dynamic *process* of adaptation (all reactions and processes caused by the diagnosis), and a *response* or outcome (e.g., life changes, QoL) (Livneh, 2022). The first factor, antecedents, can be recognized by two concepts: first, triggering events, cancer, or aggressive treatment; second, contextual variables of individuals: physiological (health status, age, gender), psychosocial (emotional aspects and family situation) and environmental (social, cultural, economic). The second factor of the process of psychosocial adaptation is also conceptualized by two aspects: (1) short-term and long-term psychosocial responses to the antecedents and (2) circumstantial variables that are dynamic and changing. Meanwhile, circumstantial variables include moderating, mediating or interacting variables that directly or indirectly affect adaptive responses. These variables could include psychological characteristics, such as self-esteem, self-efficacy or coping styles, and variables related to the external environment, such as the availability of social support (Ehrlich et al., 2016). The third factor of the Livneh's model refers to outcomes, which focuses on QoL in the context of illness/disability.

Based on Livneh's (2022) model, we can draw attention to the importance of moderating factors for patients' QoL. Overall, we can find research analysing various psychological aspects that relate to the QoL of people with HSCT, such as emotional support, optimism, hope, mastery and social support (Amonoo et al., 2019; Ehrlich et al., 2016; Liang et al., 2018b). In the current study, we examined patient empowerment (PE) as a moderating psychological construct between emotional well-being and QoL (Factors 2a and Factor 3 according to Livneh's model). To the best of our knowledge, there are no studies investigating the function of empowerment in the HSCT patient population. One of the reasons to account for this could be that, for a long time, there was a common understanding that HSCT is an aggressive and threatening procedure, and people with haematological seem to be more likely to prefer a passive role in the treatment decision-making compared to patients with other

types of cancer (Noteboom et al., 2021). However, we can find studies showing that people with haematology are increasingly opting for a collaborative, active role and involvement in decision-making (Carey et al., 2012; Rood & Huijgens, 2017; Yogaparan et al., 2009).

As the health care system becomes increasingly patient-centred, the focus on patient involvement in decision-making, their active participation in the treatment process, and empowerment become increasingly relevant (Holmström & Röing, 2010). PE is considered to be one of the most important mechanisms that can help people with cancer maintain some control over their illness experience (Park & Park, 2013). Nevertheless, PE still lacks a uniform definition, and the use of this term remains obscure. Sometimes, it is used as a synonym for other concepts, such as self-efficacy, self-management and enablement. In recent psycho-oncological studies, we can also find concepts such as informed consent and health literacy (Eskildsen et al., 2017; Merluzzi et al., 2019). Park and Park (2013) argued that all these constructs can be considered as characteristics of empowerment.

In their systematic review, Castro et al. (2016) summarized that PE includes intrapersonal, interactional, and behavioural components. This means that the patient must consciously participate in the treatment process, as otherwise empowerment cannot be effectively facilitated. It is important to note that PE is understood as a subjective, individual feeling; however, it is not a static, unchanging property, but rather a dynamic and context-driven construct (Castro et al., 2016).

The literature on HSCT contains studies that describe a positive association between empowerment intrapersonal components, such as self-efficacy (O'Sullivan et al., 2018) and resilience (Campo et al., 2017) and patients' QoL, and behavioural components, such as active involving in symptoms management and better QoL (Jo et al., 2022). As self-efficacy and QoL have been shown to be positively associated, it is possible that psychological empowerment could also be related to QoL. In this study, we examined the PE like moderating factor that can explain the relationship between patients' depression, anxiety, and QoL, as previous studies focused solely on testing the levels of QoL. We tested how patients' empowerment is related to their QoL, depression and anxiety before HSCT and in the early period, 10–12 weeks after HSCT. We hypothesized that PE before transplantation will have a significant moderating effect on patients' QoL post-HSCT.

2 | METHODS

2.1 | Design, setting and participants

This longitudinal study was designed to examine PE, depression, anxiety and QoL of HSCT patients pre- and post-HSCT for 10–12 weeks following the transplant. Patients who were treated at the Vilnius University Hospital Santaros Clinics Hematology, Oncology, and Transfusion Medicine Center between September 2020 and April 2022 were informed about this study. The inclusion criteria for

participants were: (1) aged 18 years or older, (2) sufficient knowledge of the Lithuanian language to be able to understand and respond to the questionnaires, (3) have no cognitive impairment caused by the oncohematological disease (e.g., CNS lymphoma) and (4) participation in this study was voluntary, therefore the consent to participate in this longitudinal study was required.

2.2 | Measurements

2.2.1 | Sociodemographic and cancer-related characteristics

The sociodemographic and cancer-related data were obtained from the medical patient files and were recorded using a self-evaluation questionnaire. Each participant completed a demographic questionnaire that included questions regarding age, sex, marital status, income, work status and educational level. We reviewed patients' electronic medical records to obtain data regarding cancer diagnosis (multiple myeloma, acute leukaemia, lymphoma, chronic leukaemia and others), treatment regimen (type of transplantation, autologous or allogenic) and ECOG functional status (ECOG—Eastern Cooperative Oncology Group Note).

2.2.2 | Patients' depression and anxiety measurement

The Beck Depression Inventory is one of the most widely used instruments for screening and measurement of depression and its intensity (Beck et al., 1996). The BDI-II is a 21-item self-report questionnaire with four response options for each item (from 0 to 3). The items of the BDI-II are assessing different symptoms of depression, such as sadness, hopelessness, self-blame, guilt, fatigue and loss of appetite. Participants are asked to choose the statement (from 0 to 3, where 0=absent/not at all disturbing to 3=I could barely stand it) that best describes their attitude towards these items. Scores on the BDI-II can range from 0 to 63 and are often classified as follows: 0–13 no depression, 14–19 mild depression, 20–28 moderate depression and 29–63 severe depression. The BDI has high reliability and validity, with Cronbach's alpha for the current sample in the first study milestone (before HSCT) of 0.90 and in the second milestone (after HSCT) – 0.89.

The Beck Anxiety Inventory is a standardized 21-item measure that assesses the presence and severity of common symptoms of anxiety, both psychological (e.g., feeling nervous, scared) and physical (e.g., heart pounding, hand trembling). A 4-point scale (0=absent/not at all disturbing to 3=I could barely stand it) was used; items were summed up with total scores ranging from 0 to 63: from 0 to 7 points – no anxiety, from 8 to 15 points – mild anxiety, from 16 to 25 points – moderate anxiety, and 26 or more points – severe anxiety (Beck et al., 1996). The BDI has high reliability and validity indicators, in this study, Cronbach's alpha was 0.92 in both milestones.

The BDI-II and BAI are often used in psycho-oncology studies. In 2016, Vilnius University Laboratory of Applied Psychology signed an agreement with Pearson Publishing House, which is the copyright holder of the Beck scales, the above Beck scales were translated into Lithuanian by two independent translators, then the research team compared the translations, and agreed on the final wording of the statements. A back-translation into English was carried out and compared with the original version. Normative and clinical sample data were collected and published by Gri-gutyte et al. (2022).

2.2.3 | Patients' QoL measurements

Functional Assessment of Cancer Therapy - Total was used to assess patients' QoL.

FACT-T are self-report measures of QoL created for people with cancer that assesses four primary dimensions of QoL: physical well-being, social/family well-being, emotional well-being, functional well-being, and specific symptoms caused by transplantation (BMT subscale). FACT has 50 items, 27 general questions, and 23 specific questions for people with HSCT. Items are scored on a 0 to 4 scale (0=not at all; 1=a little bit; 2=somewhat; 3=quite a bit; 4=very much), with higher scores indicating better QoL. Permission to use the scales in this research is granted by [FACIT.org](https://www.facit.org). Cronbach's alpha for the current sample was 0.89 in the first milestone and 0.92 in the second milestone.

2.2.4 | Empowerment measurement

The Health Empowerment Scale (HES, Park & Park, 2013) measures general health empowerment with eight items measured on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). The short version of the scale covers key empowerment constructs such as: self-efficacy, self-control, problem-solving, support, psychosocial coping, motivation, decision-making and competence. The short version of the scale consists of only eight statements, which is very important for research participants with more severe somatic conditions. The HES asks participants to indicate their level of power or control over managing their health problems and health care. Higher scores for the empowering subscale indicate that participants perceive a higher level of health-related empowerment (Park & Park, 2013). The HES is a well-known scale, frequently used in health psychology and translated into Spanish, Korean, German and French languages (Bravo et al., 2015). The Cronbach's alpha on the current sample was 0.83 in the first milestone and 0.79 in the second milestone.

Written permission was obtained from Professor Park to adapt the HES into Lithuanian and to use the instrument in this study. To assess the validity and reliability of the HES, the original version of the instrument was translated into Lithuanian by two independent translators (clinical psychologists with excellent English language

skills), after which the translations were discussed judging their accuracy, clarity and cultural relevance to the translation. After a discussion, a consensus was reached. To ensure the quality of the translation, a back translation into English was carried out. A pilot test with 92 respondents was performed. As a result, the HES had acceptable validity and the Cronbach's alpha of HES was 0.85 in the pilot study, and 0.83 in the main study sample.

2.3 | Data collection

In the first stage, during the admission to the Bone Marrow Transplantation Unit, the study investigator introduced patients to this research (i.e., they were introduced to the aims and presented the demographic questions). If patients agreed to participate, they signed a consent form and completed the questionnaires (BDI-II, BAI, FACT-T, HES). The average time of the first meeting was about 40 min. The second stage was 10–12 weeks after the HSCT, once patients were discharged from the hospital, 10 weeks after the autologous HSCT and 12 weeks after the allogeneic HSCT. When patients arrived for the follow-up medical tests, they were presented with follow-up questionnaires (BDI-II, BAI, FACT-T, HES), which took an average about 20 min.

2.4 | Data analysis

SPSS (version 26.0) was used for data analysis. First, descriptive statistics, mean and standard deviation (SD, for continuous variables), and numbers and percentages (for dichotomous variables) were computed to describe the sample. Second, Pearson's correlation coefficients were used to determine the relationships among PE, patients' depression, anxiety, ECOG status and QoL. Third, ANOVA was used to compare QoL differences between PE and different depression mean groups. PE and depression mean was described as follow: low group – the estimate is below one standard deviation below the mean, middle group – the estimate is between one standard deviation below and one standard deviation above the mean, high group – the estimate is above one standard deviation above the mean. Their group categorization is only derived statistically and is unrelated to the clinical interpretations of the BDI-II score.

Finally, moderation analysis was used to test the PE moderation effect on the relationship between depression, anxiety and QoL (Hayes, 2018). Moderation analysis was conducted using the SPSS macroPROCESS to determine how empowerment (W) moderates the association between depression, anxiety (X) and QoL (Y) after HSCT. A moderating multiple regression involving a two-way interaction of the independent variables was chosen to test the predictive effect of the (W) variable on the outcome variable (Y). Meanwhile, the (X) variable is considered as the main independent variable. The variables were mean centered. Based on the underlying "symmetry in moderation" (Hayes, 2018), the assignment of the X

and W variables to the main independent variable or moderator is a conceptual or theoretical rather than a statistical issue. In this study, moderators were selected based on the conceptual model, that PE has a moderation effect for depression and QoL association.

Before the statistical calculations were performed, the normal distribution of the scales and subscales used in this study was checked (Kolomogrov-Smirnov, Histogram, Normal Q-Q Plot, Detrended Normal Q-Q Plot, Boxplot). The data from the BDI-II, BAI, HES and FACT-T questionnaires were found to be normally distributed.

2.5 | Ethical consideration

The study was approved by the Lithuanian Bioethics Committee (2020/3-1217-699), and Vilnius University Ethics Committee (2020-06-30, Nr.49). Participation in this study was voluntary, before the participation, patients were given information about the aim of the study and their rights to participate or to quit it at any time. All the participants signed informed consent forms, to ensure participants' privacy, the data were coded anonymously.

3 | RESULTS

3.1 | Demographic and disease-related characteristics

Between September 2020 and April 2022, 247 patients with hematologic malignancies were undergoing treatment for allogeneic or autologous HSCT in the Vilnius University Hospital Santaros Clinics Bone Marrow Transplantation Department, and 150 (61%) of them completed the pre-transplant assessment. Of the remaining 97 (39%), $n=42$ (43%) declined participation, 16 (17%) were unable to complete pre-transplant questionnaires due to their medical conditions (e.g. CNS disorders), and $n=39$ (40%) had insufficient language knowledge. Participants and non-participants did not significantly differ in other medical characteristics (diagnoses and HSCT type). Independent T-test showed statistically significant differences between participant and non-participant age ($p>0.015$) – more elderly patients declined participation. A priori G*Power calculation suggested that to reach a medium effect, the main multiple regression model that includes three predictors (see below) will require a total sample of 77 participants.

The first study milestone, before HSCT, included 150 adult Lithuanian-speaking patients, and 121 patients completed the second milestone questionnaire, after HSCT. A summary of the baseline characteristics of the study participants in both milestones (pre-HSCT, $N=150$ and post-HSCT, $N=121$) is presented in Table 1. Among the 150 participants, 29 (19%) dropped out by the second study milestone, post-HSCT. Participants were lost due to a compromised medical status ($n=12$, including five relapses and seven deaths) or a withdrawal from participation ($n=17$). We compared the baseline characteristics of the missing sample ($n=29$) and the rest of the sample ($n=121$) and found that there was no statistical difference in characteristics between the

TABLE 1 Sociodemographic and medical sample characteristics pre-HSCT ($N=150$) and post-HSCT ($N=121$).

Variable	Pre HSCT N (%)	Post HSCT N (%)
<i>Age</i>		
Mean (SD)	54.96 (11.87)	55.31 (11.83)
<i>Gender (%)</i>		
Male	74 (49.3)	55 (45.5)
Female	76 (50.7)	66 (54.5)
<i>Marital status (%)</i>		
With partner	108 (72.0)	86 (71.1)
Without partner	42 (28.0)	35 (28.9)
<i>Educational level (%)</i>		
Primary school	6 (4.0)	6 (5.0)
Secondary school	45 (30.0)	35 (28.9)
College/University	99 (66.0)	80 (66.1)
<i>Work status (%)</i>		
Employed	86 (57.3)	68 (56.2)
Unemployed	22 (14.7)	16 (13.2)
Student	4 (2.7)	4 (3.3)
Retired	35 (23.3)	30 (24.8)
<i>Income level (%)</i>		
High	16 (10.6)	11 (9.1)
Middle	123 (82.0)	101 (83.5)
Low	11 (7.4)	9 (7.4)
<i>Diagnosis (%)</i>		
Myeloma	71 (47.3)	57 (47.1)
Lymphoma	26 (17.3)	23 (19.0)
ALL/AML	28 (18.7)	24 (19.8)
CLL/CML	7 (4.7)	5 (4.1)
Other	18 (12.0)	12 (9.9)
<i>HSCT type (%)</i>		
Autologous	96 (64.0)	75 (62.0)
Allogeneic	54 (36.0)	46 (38.0)
<i>ECOG status (%)</i>		
Fully active	75 (50.0)	59 (48.7)
Active	66 (44.0)	56 (46.3)
Min help	7 (4.7)	4 (3.3)
Max help	2 (1.3)	2 (1.7)

two groups, except for the transplantation type: patients who dropped out were more likely to have undergone autologous transplant versus allogeneic transplant ($p<0.001$).

3.2 | Relationship between PE, depression, anxiety, and QoL before and after HSCT

Table 2 shows that the pre-HSCT participants have below-average depression, average anxiety, and average QoL level. We did not

find a statistically significant difference between the means of the scales of the first phase (before HSCT) and the second phase (after HSCT). However, when comparing the mean scores of anxiety and depression experienced by HSCT patients with the normative sample (Table 3), we see that depression and anxiety in HSCT patients are statistically significantly higher than in the normative sample ($p < 0.001$).

Table 4 presents correlations between PE (HES), depression, anxiety (BDI, BAI), and QoL (FACT-T) in both milestones. Pre-PE was significantly positively related to pre-HSCT QoL ($r = 0.358$, $p < 0.01$) and post-HSCT QoL ($r = 0.183$, $p < 0.05$). PE before HSCT had also a small but significant negative correlation with depression ($r = -0.189$, $p < 0.05$) and anxiety ($r = -0.184$, $p < 0.05$), post-HSCT PE negatively correlated with depression ($r = -0.212$, $p < 0.01$). This means that patients who were more empowered before HSCT had a subjectively better QoL before and after HSCT, patients who were more empowered post-HSCT had lower depression scores post-HSCT ($r = -0.212$). After HSCT, depression ($r = -0.560$, $p < 0.01$) and anxiety ($r = -0.585$, $p < 0.01$) had a significant negative correlation with QoL. We also found, that ECOG correlated with depression ($r = 0.249$, $p < 0.01$) and anxiety ($r = 0.170$, $p < 0.05$) before HSCT and ECOG correlated with post-HSCT depression ($r = 0.263$, $p < 0.001$).

Independent sample T-test showed a significant relationship between gender, depression, anxiety and QoL – women are more anxious before HSCT ($M = 14.36$, $SD = 8.83$) and after HSCT ($M = 13.53$, $SD = 8.01$) than men (before HSCT $M = 9.32$, $SD = 6.99$, $p = 0.001$; after HSCT $M = 9.73$, $SD = 6.52$, $p = 0.002$). Women are more depressed after HSCT ($M = 11.75$, $SD = 7.64$) than men ($M = 8.91$, $SD = 5.14$, $p = 0.009$) and women had worse QoL in both milestones (before HSCT $M = 128.42$, $SD = 17.64$; after HSCT $M = 127.27$, $SD = 18.93$) when men (before HSCT $M = 135.41$, $SD = 16.13$, $p = 0.012$; after HSCT $M = 133.11$, $SD = 16.76$, $p = 0.047$). We found

TABLE 2 Depression, anxiety, patient empowerment (PE) and quality of life (QoL) scales average differences before and after hematopoietic stem cell transplantation (HSCT) (independent T-test).

Scales	Before HSCT	After HSCT	t	Df	p
	M (SD)	M (SD)			
BDI-II	11.71 (8.46)	10.22 (8.48)	1.517	89	0.133
BAI	11.76 (8.74)	11.76 (8.47)	0.000	117	1.000
HES	30.09 (6.5)	29.54 (5.82)	0.995	114	0.322
FACT-T	98.31 (13.80)	96.48 (15.75)	1.413	115	0.160

Scales	Normative sample (N = 231)	HSCT sample (N = 150)	t	Df	p
	M (SD)	M (SD)			
BDI-II	5.65 (7.39)	11.71 (8.46)	10.103	149	<0.001
BAI	6.33 (7.39)	11.76 (8.74)	8.140	149	<0.001

no statistically significant difference in PE between women and men, either before or after HSCT.

3.3 | QoL differences between PE and depression groups

Although we found that PE was negatively associated with depression and anxiety before HSCT, and with QoL at both pre-HSCT and post-HSCT, we used ANOVA (see Table 5) to evaluate the post-HSCT QoL between the different groups of PE and depression mean before HSCT. The results showed that there were statistically significant differences in QoL after HSCT between more and less empowered and depressed patients. PE before HSCT has a significant effect on QoL after HSCT only among lower than moderately depressed patients ($M = 144.03$, $SD = 18.19$, $p = 0.002$). For patients with moderate or higher than moderate depression levels before HSCT, PE has no significant effect on QoL post-HSCT ($p = 0.856$ and $p = 0.529$).

3.4 | PE moderation between QoL and depression, and anxiety

In Model 1, we tested whether PE before HSCT moderates the relationship between depression and QoL after HSCT (see Figure 1). The overall model explained 13% of the variance, $F(df) = 7.26$, $p < 0.001$. The interaction was statistically significant and negative ($b = -0.076$, $s.e. = 0.03$, $p = 0.0124$). This implies that PE was a significant moderator for the impact depression has on QoL after HSCT. The interaction term explained an additional 13% of the variation in QoL. The effects that depression had on QoL was $b = -0.639$, $s.e. = 0.19$, $p = 0.012$, which is conditional on PE being equal to 0 (mean level of PE). Similarly, the conditional effect that PE had on QoL was $b = 0.421$, $s.e. = 0.22$, $p = 0.057$, also conditional on depression being average.

To better illustrate the results, see Figure 2 for the depiction of the relationship between QoL and depression based on different levels of PE. Under conditions of higher PE (Mean + 1 SD = 6.5022), depression is significantly negatively correlated with QoL ($b = -1.1342$, $s.e. = 0.29$, $p < 0.001$), such that lower depression is associated with higher QoL. At medium PE levels, the relationship between depression and QoL after HSCT was also significantly negatively correlated ($b = -0.6393$, $s.e. = 0.19$, $p < 0.0012$), but under the condition of lower PE (Mean - 1 SD = -6.502) relationship between depression and QoL after HSCT was not significant ($b = -0.1443$, $s.e. = 0.26$, $p = 0.5845$).

TABLE 3 Depression differences between normative and hematopoietic stem cell transplantation (HSCT) patients' sample.

In Model 2, we examined whether PE moderates the relationship between anxiety and QoL after HSCT. The overall model explained 18% of the variance and was significant, $F(df) = 11.24, p < 0.001$. The effects that anxiety had on QoL was $b = -0.860, s.e. = 0.19, p < 0.001$. The interaction was not statistically significant ($b = 0.003, s.e. = 0.02, p = 0.898$), this implies that PE was not a significant moderator for the impact anxiety has on QoL after HSCT (see Figure 3).

4 | DISCUSSION

The results of our study show that pre-HSCT (before haematopoietic stem cell transplantation) depression and anxiety are associated with lower patient QoL both before and after HSCT, and are also associated with poorer patient physical functioning (ECOG status). The reason to assess depression and anxiety before HSCT is based on the theoretical

TABLE 4 Correlations between PE (HES), emotional well-being (BDI, BAI), ECOG, and quality of life (QoL) (FACT-G) pre- and post-HSCT.

	Pre PE	Post PE	Pre FACT-T	Post FACT-T	ECOG	Pre BDI-II	Post BDI-II	Pre BAI	Post BAI
<i>Pre PE</i>									
<i>r</i>	1								
<i>p</i> -value									
<i>N</i>									
<i>Post PE</i>									
<i>r</i>	0.477**	1							
<i>p</i> -value	<0.01								
<i>N</i>	150								
<i>Pre FACT-T</i>									
<i>r</i>	0.358**	0.220**	1						
<i>p</i> -value	<0.01	<0.01							
<i>N</i>	150	150							
<i>Post FACT-T</i>									
<i>r</i>	0.183*	0.247**	0.526**	1					
<i>p</i> -value	<0.05	<0.01	<0.01						
<i>N</i>	150	150	150						
<i>ECOG</i>									
<i>r</i>	-0.057	-0.211**	-0.108	-0.197*	1				
<i>p</i> -value	0.490	<0.01	0.189	<0.05					
<i>N</i>	150	150	150	150					
<i>Pre BDI-II</i>									
<i>r</i>	-0.189*	-0.136	-0.454**	-0.271**	0.249**	1			
<i>p</i> -value	<0.05	0.098	<0.01	<0.01	<0.01				
<i>N</i>	150	150	150	150	150				
<i>Post BDI-II</i>									
<i>r</i>	0.006	-0.212**	-0.362**	-0.560**	0.263**	0.345**	1		
<i>p</i> -value	0.944	<0.01	<0.01	<0.01	<0.01	<0.01			
<i>N</i>	150	150	150	150	150	150			
<i>Pre BAI</i>									
<i>r</i>	-0.184*	-0.098	-0.589**	-0.420**	0.170*	0.399**	0.383**	1	
<i>p</i> -value	<0.05	0.235	<0.01	<0.01	<0.05	<0.01	<0.01		
<i>N</i>	150	150	150	150	150	150	150		
<i>Post BAI</i>									
<i>r</i>	-0.041	-0.050	-0.371**	-0.585**	0.108	0.241**	0.434**	0.638**	1
<i>p</i> -value	0.622	0.541	<0.01	<0.01	0.190	<0.01	<0.01	<0.01	
<i>N</i>	150	150	150	150	150	150	150	150	

Abbreviations: BAI, Beck Anxiety Inventory; BDI-II, Beck Depression Inventory; ECOG, functional status; FACT-T, Functional Assessment of Cancer Treatment, Total Scale; HES, Health Empowerment Scale.

* $p < 0.05$; ** $p < 0.01$.

TABLE 5 Quality of life (QoL) post -HSCT differences between patient empowerment (PE) and depression groups pre-HSCT.

HES pre-HSCT						
	Low	Middle	High			
Scale	M (SD)	M (SD)	M (SD)	F	Df	p
FACT-T post -HSCT						
Low BDI-II	99.05 (29.28)	145.33 (16.67)	144.03 (18.19)	8.087	2	<0.01
Middle BDI-II	127.76 (22.09)	129.92 (14.37)	128.03 (23.52)	0.156	2	0.856
High BDI-II	120.41 (20.38)	126.31 (11.28)	116.33 (9.86)	0.663	2	0.529

Abbreviations: BDI-II, Beck Depression Inventory; FACT-T, Functional Assessment of Cancer Treatment total; HES, Health Empowerment Scale; High group, the estimate is above one standard deviation above the mean; Low group, the estimate is one standard deviation below the mean; M, mean; Middle group, the estimate is between one standard deviation below and one standard deviation above the mean; SD, standard deviation.

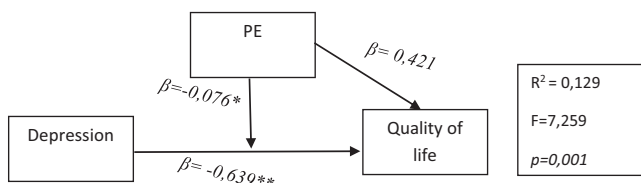


FIGURE 1 Patient empowerment (PE) moderating effect on quality of life and depression relationship.

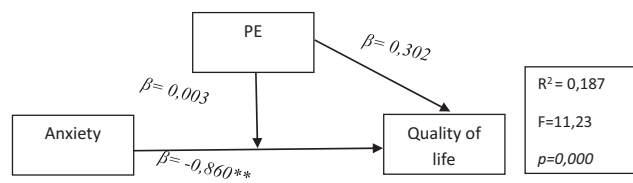


FIGURE 3 Patient empowerment (PE) moderating effect on quality of life and anxiety relationship.

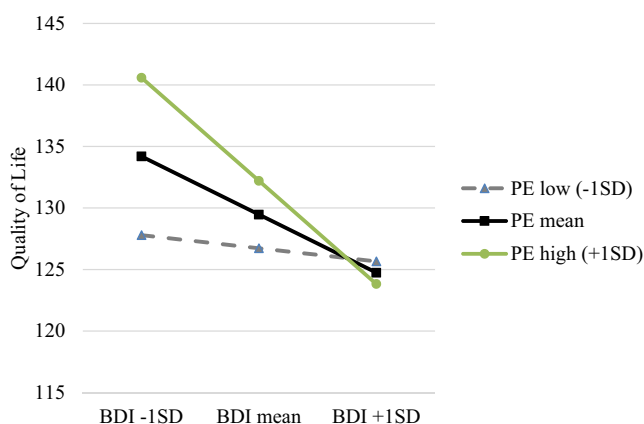


FIGURE 2 Interaction between depression (BDI-II) and psychological empowerment (PE) depicting the effects on quality of life.

and practical argument that pre-treatment depression is prognostically unfavourable as it tends to worsen after HSCT, whereas anxiety after HSCT tends to decrease (El-Jawahri et al., 2015; Seo et al., 2019).

We found that PE is positively associated with patients' QoL both before and after transplantation, implying that empowered patients have a better QoL as a whole. However, when analyzing the associations of PE with depression and anxiety, we found that PE before HSCT is negatively correlated with both depression and anxiety, meaning that more empowered patients have lower rates of depression and anxiety, but after HSCT, PE is associated only with depression, but not anxiety. Anxiety before HSCT has also been discussed by other researchers (El-Jawahri et al., 2015; Seo et al., 2019). This finding can be explained by the uncertainty patients experience

in relation to the treatment outcomes, fear of complications and, possibly, impending death.

Our study did not find a significant relationship between anxiety and PE after HSCT, which was also not a significant moderator between anxiety and QoL. These results can be explained by the fact that, after transplantation, patients may be tired, feel physically and psychologically overworked, and weak, but also more relaxed, and less worried about the treatment and its results. Thus, PE becomes less relevant after HSCT. Perhaps also due to the fact that after the acute stage of treatment, there is less feeling of uncertainty, and readaptation to normal life and routine is prioritized instead. However, since PE is associated with lower levels of anxiety before HSCT, it is worth increasing patient empowerment before the treatment, especially as less anxious patients have a better QoL both before and after HSCT.

Concerning depression, our research results showed that PE before HSCT is a moderator between depression and QoL - the results indicate that under conditions of moderate and higher empowerment, patients with no or minimal depression have a better QoL. It is important to note that low or minimal depression is not associated with higher QoL in patients with low empowerment. Thus, it is important to assess patients' level of depression severity before HSCT and only then apply PE interventions. Patients' emotional state can be a serious interference in their PE. Depressed patients may actually be less receptive to information, passive, less interested in their environment, feel helpless and become sceptical about their improvement and treatment. According to the study by El-Jawahri et al. (2016), pre-transplant depression was associated with shorter overall survival after HSCT and a higher risk of complications.

These findings support the central assumption of the theoretical adaptation model, which states that PE is a moderating factor between patients' depression and QoL during aggressive treatment. Our study showed that transplant patients can be empowered. Different studies provide ambiguous results regarding the potential of HSCT patients' experience of empowerment and their role in treatment. Noteboom et al. (2021) found that haematological patients, especially those undergoing aggressive treatment, tend to be passive, and not actively involved in the treatment process because HSCT is such a threatening procedure that patients feel unable to be an active part of their treatment. Although empowerment itself has not been previously investigated in a sample of transplant patients, there are also several studies examining constructs close to PE or considered as a component of PE, e.g., self-efficacy relationships with patients' QoL. In these studies, the active role of patients in the treatment process is beginning to be noticed. O'Sullivan et al. (2018) found that pre-transplant self-efficacy is associated with better QoL, and physical, functional, emotional and social well-being 12 months after transplantation (O'Sullivan et al., 2018). There are a number of studies with other patient groups (e.g., those suffering from chronic diseases, other forms of cancer, or mental illnesses) that show the positive impact of empowerment on patients' QoL and emotional well-being. Empowerment extends an individual's ability to cope with the disappointing consequences of cancer. PE also stimulates self-efficacy, decreases vulnerability to stressful events, and improves self-esteem and control over life (Eskildsen et al., 2017; Merluzzi et al., 2019).

For PE to work, the patient should be receptive to empowerment; however, symptoms of depression can impede this. Since the effect of PE is significant only at low levels of depression, it is very important to apply the assessment of patients' psychological status (depression and anxiety) before HSCT. Studies of patients' emotional states prior to HSCT can help identify those at high risk for post-transplant difficulties, both physical and psychological (Devins et al., 2018; El-Jawahri et al., 2015; Liang et al., 2018a).

In our findings, women experience more anxiety and depression and have lower QoL compared to men. Research data from other countries are mixed, revealing different results regarding gender (Nakamura et al., 2019; Park et al., 2019). These differences can be related to both cultural context (e.g., social gender inequality) and to women's greater ability to reflect on their feelings and disclose emotional difficulties, which is less characteristic in men.

4.1 | Limitations and future directions

This study has some limitations. This is the first attempt to study PE in a sample of people with HSCT. The study is based on patients' subjective experience of PE and does not test PE methods or techniques. It is also a relatively small sample size, so the data must be interpreted with caution. We acknowledge that the results may be somewhat biased because we gathered data from patients who voluntarily agreed to participate in the study, which may have

influenced the overall results of. Treatment type homogeneity of the study sample also affected the data. It would be beneficial to compare the data of the subgroups to compare the diagnosis and nature of the transplant (auto- and allo-HSCT).

5 | CONCLUSION

This study tested a model of the relationships of patients' depression, anxiety, QoL and psychological construct such as PE before and after HSCT and the moderating effect of PE among study variables. The study results showed that PE was a significant moderator between patients' depression and QoL in the post-HSCT. Some previous studies have shown that haematological patients tend to be passive due to highly aggressive treatment and unpredictable disease course, with little involvement in the active role of treatment. However, our study showed that PE was a significant moderator between patients' depression and QoL. This leads to the cautious conclusion that empowered patients have better QoL and emotional well-being. Further detailed research on PE and its relationship with patients' depression, anxiety, and QoL will allow us to understand its impact on patients in aggressive treatment.

5.1 | Relevance to clinical practice

The results imply that attention to PE in people with cancer before HSCT is crucial to enhance QoL. In light of these results, we recommend that patients undergo routine screening for depression and PE prior to HSCT to be able to identify highly depressed and low-PE patients at an early stage and offer intervention strategies based on individual patient results. Psychosocial interventions may be beneficial to increase patient emotional well-being and empowerment, and this type of intervention may lead to better overall QoL for people with HSCT. PE interventions include awareness, involvement in treatment decision-making, patient activation, and regaining a sense of control. In line with the person-centered approach, it would be important for the treatment team (doctors, nurses, social workers, psychologists, et al.) to apply these interventions to people with HSCT to improve their emotional well-being and QoL before and during transplantation. It is particularly important to involve nurses in the application of empowerment techniques, as they are the closest to the patient during HSCT, the ones who interact the most with them and act as intermediaries between the doctors and the patients. Nurses can serve as advocates throughout the transplant and often act as a motivating force, supporting and, advising and supplying physical, psychological, and emotional care for patients.

AUTHOR CONTRIBUTIONS

MT, RS and RS-R contributed to the design and implementation of the research. JP, RS-R and MT analyzed the results, and MR wrote the manuscript. RS conceived and supervised the project.

All author(s) affirm that the methods used in the data analyses are suitably applied to their data within their study design and context, and the statistical findings have been implemented and interpreted correctly.

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CONFLICT OF INTEREST STATEMENT

The authors report there are no competing interests to declare.

DATA AVAILABILITY STATEMENT

Author elects to not share data.

ETHICS STATEMENT

The study was approved by the Lithuanian Bioethics Committee (2020/3-1217-699) and Vilnius University Ethics Committee (2020-06-30, Nr.49).

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