

## Impact of Female Representation in Management and Supervisory Boards on Companies' Performance

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**Abstract:** *This paper examines the impact of female representation on management and supervisory boards on company performance. The sample includes 187 Croatian companies from the Lidermedia Journal ranking for 2017–2021. Using panel data analysis and secondary data, the study finds that a higher percentage of women on management boards is associated with better financial performance, measured by return on assets (ROA) and return on sales (ROS). However, the results did not indicate a significant impact of female representation in supervisory boards on these indicators. Uneven results for the management and supervisory boards can be attributed to the different roles each board plays within the company from a corporate governance perspective. Moreover, the impact they have on the company's performance could have various significances. Including supervisory boards in such analyses remains essential to address gaps in gender composition research.*

**Keywords:** management and supervisory board; female representation, ROA; ROS; organizational performance

**JEL Classification:** M12, M21

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## Introduction

In the last few decades, managerial, scientific and academic circles have increasingly investigated how heterogeneity in management structures affects companies' performance. During this period, the top management team became increasingly heterogeneous due to demographic changes, the higher employment of all ethnic groups, and the globalization process (van Knippenberg & Schippers, 2007; Williams & O'Reilly III, 1998). Special attention is still paid to the equality of females in companies' management positions. One of the main reasons to investigate management heterogeneity is the potential difference between male and female leadership styles.

Through educational choices, gender roles influence the skills of male and female employees, creating different professional opportunities for them (Ferarry, 2018). Female managers encourage participation by soliciting information from others, sharing power and information through open communication channels with their subordinates, and bolstering subordinates' sense of self-worth (Ferrary & Déo, 2023). Post and Bryon (2015) argue that gender differences in cognitive frameworks regarding ethical thinking, risk aversion, and concerns about the legitimacy, values, and experience of female directors will influence how much the boards monitor. The same authors claim that boards with more female directors will exhibit higher levels of strategy involvement (Post & Bryon, 2015). Biswas, Roberts, and Stainback (2021) emphasize the critical role of female directors in promoting greater gender diversity in the workplace. Ferrary and Déo (2023) claim that, therefore, we can expect that such differences affect companies' performance. These findings underscore the importance of investigating the heterogeneity of management and supervisory boards in companies, as well as the representation of females in managerial positions. The Croatian market is interesting, as it is a developing capital market, and a notable lack of work in this area can be identified across the European Union. Croatia offers a unique opportunity to advance corporate governance, particularly through its two-tier governance model. This setting allows the study to address underexplored aspects of gender diversity on supervisory boards, highlighting the original contribution of this paper to the existing literature.

Considering the above, we set two research objectives: *RO1. To define gender heterogeneity among management and supervisory boards in Croatian companies* and *RO2. To examine the impact of female members in management and supervisory boards in Croatian companies on the companies' performance*. Based on the defined research objectives, the research questions to be answered in this paper are as follows: *RQ1: What is the level of representation of females in the supervisory and management boards of Croatian companies?*, *RQ2. Do female members in management and supervisory boards impact Croatian companies' performance?* and *RQ3. How do female members in management and supervisory boards in Croatian companies impact companies' performance?*

Before presenting the research results using panel data analysis, we review the recent literature on the relationship between gender heterogeneity in management structures and companies' performance. Finally, we present the research results, a discussion, and the most important conclusions.

## Literature Review and Hypotheses Development

Over the last decade, gender heterogeneity in Europe has been a significant issue. Additionally, when the Women on Boards Directive, a crucial part of the EU Gender Equality Strategy, was implemented in December 2022, this issue primarily focused on larger companies (iod.com, 2023). Croatian companies are also included in this policy. Besides these regulations, numerous research studies have proven that female members can positively impact companies' financial performance (Egerová & Nosková, 2019). Therefore, the upper echelon theory underlies this postulate.

The upper echelons theory posits that organizational outcomes, strategic decisions, and firm performance are partially predicted by the manager's background characteristics, referred to as cognitive frames (Hambrick & Mason, 1984). Gender is one category of the manager's cognitive frames. Throughout history, corporate managers have been predominantly male, and the change in the gender composition of top management teams was an exception to broader societal changes (Reed, 2019). "*Gender diversity reduces conflicts of interest between managers and shareholders*" (Lakhal et al., 2015), which implies that gender heterogeneity is also rooted in agency theory (Jensen & Meckling, 1976). Agency theory concerns the agency relationship that arises when one or more persons (principals) engage another person (agent) to perform specific services on their behalf, including the delegation of decision-making authority (Jensen & Meckling, 1976). In this relationship between the principal and agent comes the agency problem, arising from the inconsistency between the principal's and the agent's objectives (Roth & O'Donnell, 1996). In other words, gender diversity reduces the differences in objectives between managers and shareholders.

Moreno-Gómez, Lafuente, and Vaillant (2018) state that the female leadership style is characterized by better cooperation, information sharing, and efficient decision-making, which can positively impact companies' performance. Fan et al. (2019) state that female managers are more independent and proactive monitors as they are not part of "*old boys' networks*" and have less tolerance for opportunistic behaviors. Therefore, female managers differ from male managers in terms of background, skill, and knowledge base, and are better equipped to make monitoring decisions by facilitating divergent and critical thinking (Fan et al., 2019). Including female managers in the top management team introduces new experiences, thinking, and perspectives into a company's strategy and initiatives (Kolev & McNamara, 2019). Tang et

al. (2021) claim that the strategic advantage of gender heterogeneity in management boards does not exclusively result in female impact, but rather stems from the typical work styles of females and males. Zeike et al. (2019) argue that gender can also influence digital leadership, a new concept in the digital era. This statement is supported by research showing a significant difference between male and female managers regarding self-assessment of digital leadership (Author, 2023). Those results suggested that female managers believe success stems from working hard, rather than possessing certain abilities (Rosenthal, 1995).

Lückerath-Rovers (2013) confirms that companies with female board members perform better than those without. As indicators of companies' financial performance, this author takes return on equity (ROE), return on sales (ROS), and return on invested capital. Female representation on the board and the appointment of new female managers are also positively associated with the companies' performance (Quin, 2016). As indicators of companies' financial performance, this author takes return on assets (ROA) and ROE. The same indicators of companies' financial performance are also used by Moreno-Gómez and Calleja-Blanco (2018), and their results support the notion that female presence in corporate governance positions (such as the board of directors, top management team, and chief executive officer) is positively associated with companies' performance. Cambrea et al. (2017) find that top management teams with greater gender heterogeneity outperform those with less heterogeneity over a five-year period. These authors take ROA as an indicator of a company's financial performance. Isidro and Sobral (2015) demonstrate a positive effect of female board members on financial performance. As indicators of companies' financial performance, these authors consider the ROA and ROS. The same indicators of companies' financial performance (including also ROE) are used by Kiliç and Kuzey (2016), and their results show that including female members on boards is positively related to the companies' financial performance.

Although the majority of research has shown a positive relationship between female representation on boards and companies' financial performance, studies also show no relationship between greater female representation on boards and companies' financial performance. In their study, Singh, Singhania, and Sardana (2019) concluded that the proportion of female members on the board is insignificant and cannot impact a company's financial performance. Yasser (2012) indicates that there is no significant relationship between board gender heterogeneity and companies' performance in Pakistan. Gallego-Álvarez, García-Sánchez, and Rodríguez-Domínguez (2010) demonstrate that companies with higher levels of gender heterogeneity do not consistently outperform those with lower levels in terms of several market and accounting measures. These authors concluded that gender heterogeneity may not influence companies' performance. Also, Noland, Moran, and Kotschwar (2016) find no impact of board gender quotas on companies' performance. However, their analysis of a global survey of 21,980 firms from 91 countries suggests female presence in

corporate leadership positions may improve companies' performance (Noland, Moran, & Kotschwar, 2016).

Previous research on the sample of the largest Croatian companies conducted by Author (2019) showed contradictory research results, in which a statistically significant difference was found in the performance of companies with female members on supervisory boards, while this was not the case with the management board. Similar results were obtained in research on a sample of Croatian companies, based on the total revenue criterion in 2018 (Author, 2022). The more successful joint-stock companies are those with at least one female member on the supervisory board, while the less successful are those with one or more female members on the management board (Author, 2022).

Fagač, Podrug, and Vrdoljak Raguž (2024) examine the role of the supervisory board in corporate governance and analyze the characteristics and performance of female members on supervisory boards. Their results, based on a survey of 60 large Croatian companies, found that companies with females on their supervisory boards achieved higher average profitability than those without (Fagač, Podrug, & Vrdoljak Raguž, 2024).

Some authors claim that the number of female supervisory board members has a positive impact on the number of female management board members (Fleischer, 2022). The supervisory board also plays a crucial role in the corporate governance system because it adopts strategies vital to the company's survival and growth (Fagač, Podrug, & Vrdoljak Raguž, 2024). According to these assumptions, we analyzed the gender heterogeneity of both boards. Furthermore, despite this, a gap can be observed in the existing literature regarding research that investigates the heterogeneity of management and supervisory boards combined, especially since a large number of studies on gender heterogeneity focus on a single-tier model of corporate governance. Based on theoretical assumptions of the upper echelons theory and the results of previous research, we formed the following research hypotheses:

**H1. The share of female members on the management board positively impacts companies' financial performance.**

*H1a. A higher level of share of female members positively impacts ROA.*

*H1b. A higher level of share of female members positively impacts ROS.*

**H2. The share of female members on the supervisory board positively impacts companies' financial performance.**

*H2a. A higher level of share of female members positively impacts ROA.*

*H2b. A higher level of share of female members positively impacts ROS.*

## Methodology of Research

### *Sample, Variables, and Data Collection*

This paper used secondary quantitative research to answer the research questions. The empirical study was conducted on 400 companies, the first 400 on the Lidermedias Journal list for 2022, operating in all sectors except the finance sector and budget beneficiaries. Those companies are excluded from the analysis because they may have specific financial indicators that differ from those of the companies being analyzed. Additionally, those peculiarities can have an impact on results. The authors defined the research timeframe as 2017-2021. The companies included in the final research sample have to accomplish the following criteria for the defined period:

1. In the defined period, they are continuously operating.
2. They have continually established a supervisory board in the defined period.
3. The board structure in the examined companies is the two-tier (continental type) model.

These criteria enabled balanced panel data analysis. After all iterations, the final research sample consisted of 187 companies that met the above-mentioned criteria. The total panel observations were 935. To obtain financial indicators (ROA and ROS), data were collected from companies' financial statements from 2017 to 2021, which are available in the Financial Agency database, info.BIZ. Data on the gender of board members was collected from the Financial Agency info.BIZ. The dependent variables in this research model were ROA and ROS. The independent variables were the shares of female members on the supervisory and management boards.

### *Dependent Variable of the Analysis*

1. ROA<sub>i,t</sub>—return on the asset is measured as the total net income divided by total assets.
2. ROS<sub>i,t</sub>—return on sales is measured as the total net income divided by total annual income.

In their research models, more authors used two measurements for companies' performance: ROA and ROS (Isidro & Sobral, 2016; Kiliç & Kuzey, 2016). ROA and ROS are the two primary ratios for profitability (Očko, 2007). Measuring a company's performance using two independent indicators to verify the consistency of research results is common in empirical studies (Marimuthu & Kolandaisamy, 2009). ROE has shown greater volatility in previous studies on the upper echelons theory in relation to ROA and ROS (Díaz-Fernández, González-Rodríguez, & Pawlak, 2014). Tobin's Q was not used because the liquidity of the Croatian market is inadequate.

### *Independent Variable of the Analysis*

In previous research on the representation of females on boards and their relationship with companies' performance, the share of female members on boards appears as an independent variable. So, the share of females on supervisory and management boards is observed. The same variable was used in their research by Bryon and Post (2015), Marimuthu and Kolandaisamy (2009), and Singh, Singhania, and Sardana (2019).

1. SHARE OF FEMALE MEMBERS ON SUPERVISORY BOARD  $_{i,t}$  - it is measured as women members divided by total members.
2. SHARE OF FEMALE MEMBERS ON MANAGEMENT BOARD  $_{i,t}$  - it is measured as women members divided by total members.

### *Research Models*

Data were collected by the author's research of the above-mentioned database. After this research stage, a static panel data analysis tested the impact of the share of female members on the supervisory and management boards on the companies' financial performance. In line with the literature review and research hypothesis, the following research models are defined:

$$ROA_{i,t} = \alpha_i + \beta_1 \text{SHARE OF FEMALE MEMBERS ON SUPERVISORY BOARD}_{i,t} + \beta_2 \text{SHARE OF FEMALE MEMBERS IN MANAGEMENT BOARD}_{i,t} + \varepsilon_{i,t}$$

$$ROS_{i,t} = \alpha_i + \beta_1 \text{SHARE OF FEMALE MEMBERS ON SUPERVISORY BOARD}_{i,t} + \beta_2 \text{SHARE OF FEMALE MEMBERS IN MANAGEMENT BOARD}_{i,t} + \varepsilon_{i,t}$$

$$i = 1, \dots, 109; t = 1, \dots, 5$$

where:

i—number of observation units,

t—number of observation periods,

$\alpha_i$ —overall intercept term,

$\varepsilon_{i,t}$ —the observation error for  $i^{\text{th}}$  units in time  $t$ , and

$\beta_1, \beta_2$ —beta coefficients.

### *Research Results*

Of the 552 management board members in 2021, 118 were female. Of 806 supervisory board members in 2021, 198 were female. Table 1 presents the descriptive analysis

results for the research sample, providing context for the subsequent analysis. The mean share of female members on the supervisory board is 0.253, indicating a low percentage of female board members. Still, the range from 1.000 to 0.000 suggests that some companies' supervisory board compositions include only females, while in other companies, members are exclusively male. Additionally, this range further highlights the under-representation of female members and suggests that it remains important to strive for equal representation of both female and male members on boards, as well as for board overall heterogeneity. Also, the mean share of females on the management board is 0.194, indicating that the average percentage of female members is under 40%. This percentage is lower than that of the supervisory board. The mean of ROA is 0.054, and ROS is 0.050.

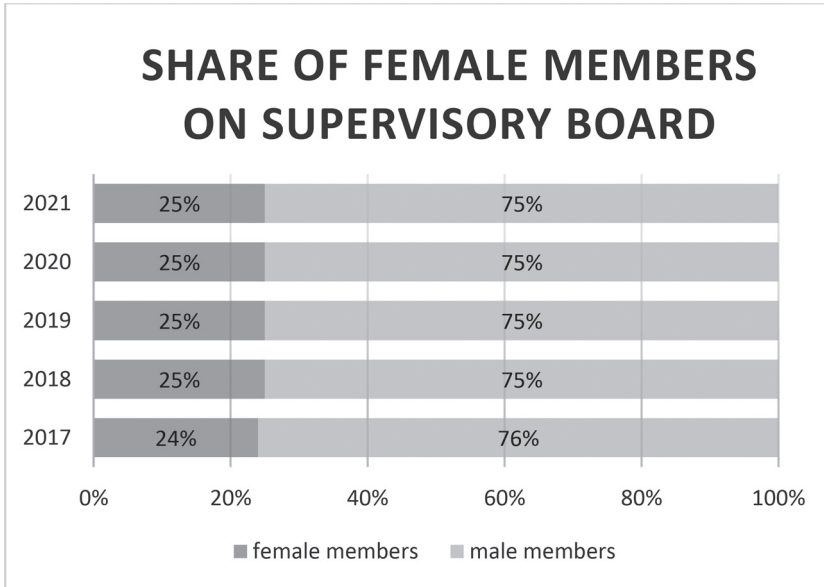
Table 1: Descriptive Statistics

	<b>ROA</b>	<b>ROS</b>	<b>Share of female members on the supervisory board</b>	<b>Share of female members on the management board</b>
Mean	0.054	0.050	0.253	0.194
Median	0.045	0.043	0.222	0.000
Maximum	1.074	2.689	1.000	1.000
Minimum	-0.916	-2.630	0.000	0.000
Std. Dev.	0.105	0.210	0.249	2.648

Source: Authors' calculations

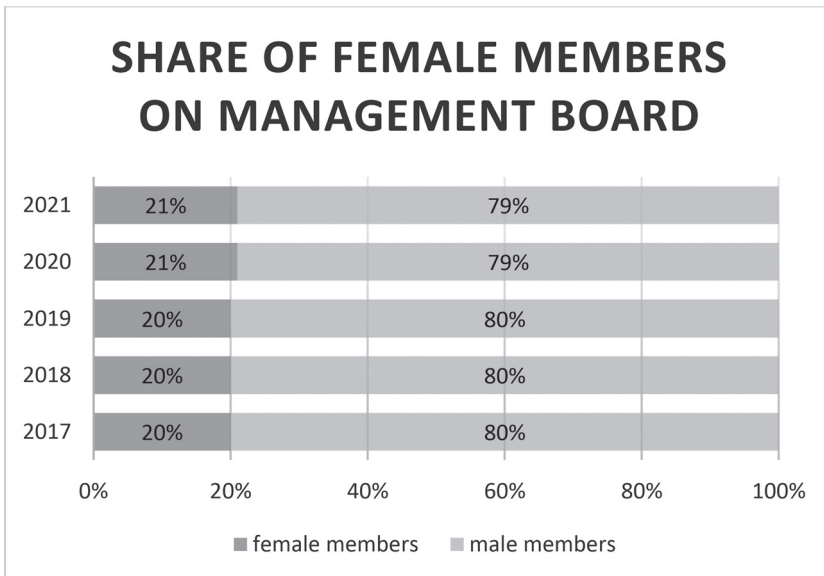
Figure 1 shows the share of females on the supervisory board over the years. Over the years, the percentage of females on the supervisory board has not increased. Figure 2 shows the share of females on the management board over the years. The number of females on the management board has not increased significantly either. Further analysis reveals that 26% of companies lacked female representation on the supervisory board during the observation period, and 43% did not have female members on the management board. These results indicate fewer females in executive positions than in supervisory functions, but in both functions, they indicate an under-representation of female members.

Figure 1: Share of Female Members on Supervisory Board



Source: Authors' calculations

Figure 2: Share of Female Members on Management Board



Source: Authors' calculations

### *Results of Panel Analysis*

Panel data analysis was chosen for several reasons. Panel data analysis is appropriate in cases where multiple variables are observed over multiple time periods, particularly when heterogeneity exists between companies (Gali, 2016). Furthermore, a large number of scholars in the field of upper echelon theory have employed panel data analysis in their research to examine the impact of heterogeneity on firm performance (Kolev & McNamara, 2020; Mohr & Batsakis, 2019; Jiang et al., 2020). Furthermore, panel data analysis is more effective in controlling for unobserved heterogeneity, i.e., other factors that influence the relationship between heterogeneity (Gordini & Rancati, 2017). To test the defined hypothesis, we performed a balanced panel analysis. To test the suitability of Ordinary Least Squares (OLS), random-effect, and the Lagrange Multiplier was conducted, and the results indicated that OLS is inappropriate for those research models. Furthermore, we conducted the Hausman specification test to determine whether random or fixed effects are more suitable for those research models. The Hausman test results indicated that the random-effect model is more appropriate for both research models. We performed static panel data with a random-effect model following these test results.

The results (Table 2, Table 3) indicate a positive and significant impact of the share of female members on the management board on ROA ( $p=0.065$ ), which indicates that a higher percentage of female members on the management board raises ROA at a significant level of 10%. According to these results, hypothesis 1a is accepted when results do not support hypothesis 2a. Results did not indicate a positive and significant impact of the female members' share on the ROA supervisory board. The ROS model suggests a positive and significant impact of the share of female management board members on ROS ( $p=0.071$ ), and hypothesis 1b is accepted. Further, hypothesis 2b is not supported because it does not indicate a significant impact of the share of female members of the supervisory board on ROS.

Table 2: Panel Data - Results of Analysis (ROA Model)

<b>Dependent variable (ROA)</b>	<b>Coefficient</b>	<b>Prob.</b>
Independent variable		
Intercept	0.043	0.000
Share of female members on supervisory board	0.021	0.240
Share of female members on management board	0.030	0.065*
Hausman test		0.148
Selected model		Random-effect
Total observation		935

\* Significant at the 10% level

Table 3: Panel Data - Results of Analysis (ROS Model)

Dependent variable (ROS)	Coefficient	Prob.
Independent variable		
Intercept	0.031	0.015
Share of female members on supervisory board	0.035	0.271
Share of female members on management board	0.053	0.071*
Hausman test		
Selected model		Random-effect
Total observation		935

\* Significant at the 10% level

## Discussion

Results indicated the under-representation of females on supervisory and management boards in the largest Croatian companies, according to *Lidermedias* Journal list. Author (2019) state that the share of female members on the supervisory board in Croatian companies in 2013 was 21%, so it can be concluded that there has been some increase in the last ten years, in 2021 it was 25%, but not significant. Therefore, Author (2019) indicated that the 2013 share of female members on the management board is 15%, which shows that in these ten years, the number of females on the management board has increased, and in 2021, it is 21%. Results also show that females have less presence in executive positions over the years than in supervisory functions. Despite this, the representation of females on boards is still not satisfactory, which is in line with Reed's (2019) claim.

The results supported the thesis that female management board members positively impact companies' ROA and ROS performance and are in line with the present studies: Lückerath-Rovers (2013), Quin (2016), Moreno-Gómez and Calleja-Blanco (2018), Cambrea et al. (2017), Chadwick & Dawson (2018) and Kiliç and Kuzey (2016). Results indicate that companies with female representation on their management boards can improve financial performance, possibly due to greater participatory decision-making and improved risk management, which should be considered when defining management board composition. Those results can be explained by the fact that the inclusion of women in the top management team creates new experiences, opinions and perspectives on company strategy and initiatives (Kolev & McNamara, 2020). The positive impact of female members on the supervisory board is not indicated. Statistically insignificant results for the supervisory board can be explained from the perspective of corporate governance, as management has a more significant influence on the company's financial performance compared to the supervisory board. An empirical study conducted by Author (2019) also shows similar results as the authors Gallego-Álvarez, García-Sánchez, and Rodríguez-Dominguez (2010)

and Singh, Singhania, and Sardana (2019). Those results can be explained by the fact that female members on the supervisory board have a lesser impact on financial performance compared to female members of the management board. Some empirical studies also show inconsistent results about the female effect on companies' performance (Tran, Ngo, & Tran, 2023); moreover, some studies also confirmed a positive impact (Fagač, Podrug, & Vrdoljak Raguž, 2024).

The contribution of this paper lies in offering empirical evidence in support of legislative efforts such as the Women on Boards Directive (European Commission, 2022). The results demonstrate that this Directive is grounded in robust empirical findings, indicating that managerial characteristics—particularly gender—play a significant role in shaping company performance. The analysis further reveals that companies take gender composition into account when appointing board members, especially within management boards. By providing a detailed overview of board structures in Croatian companies, this study addresses a notable gap in the existing literature. The findings underscore the importance of continuously promoting gender diversity at the policy level, given its confirmed impact on firm performance within management boards. Moreover, the paper contributes to the broader policy discourse and supports the implementation of gender-related governance legislation.

## Conclusion

The representation of women in management positions has been a central topic in both academic and professional discourse over the past decade. Increasing attention has also been directed toward gender diversity within corporate boards and managerial structures. Previous research and statistical evidence consistently highlight the underrepresentation of women in leadership roles. Nevertheless, the share of women in management positions has been gradually increasing each year. This trend underscores the importance of continued research in this field and the need to raise awareness among scholars and practitioners regarding the significance of gender diversity in management.

The empirical findings of this study reinforce the relevance of examining board gender composition. The results provide statistical evidence that the presence of female members on management boards can positively influence financial performance. At the same time, the findings confirm that women remain underrepresented on Croatian company boards, although their participation on management and supervisory boards has shown a steady increase over the past decade. For female supervisory board members, however, no statistically significant effect on financial performance was identified. The contribution of this paper lies in providing empirical support for legislative initiatives such as the Women on Boards Directive. The study also offers several recommendations for future research aimed at improving the empirical model by incorporating additional control and moderating variables.

This research is subject to several limitations. The sample size was constrained due to the exclusion of companies that did not meet the criteria required for balanced panel data analysis. A larger dataset could yield more robust and consistent statistical results. Moreover, the influence of the COVID-19 crisis could not be isolated from the observed financial outcomes, potentially affecting company performance during the study period. The absence of certain control and moderating variables may also have influenced the results. Variables such as company size, industry, and age should be included as controls, given their potential impact on financial performance. Future studies could extend the research period and refine the model by incorporating additional contextual variables. Recommendations for further empirical research include expanding the model to integrate potential control variables—such as industry classification, number of employees, and company age—and exploring moderating factors related to the managerial environment, including innovation intensity, market competitiveness, organizational culture, managerial discretion, and group dynamics.

## **Declarations**

### *Funding*

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### *Conflicts of interest/Competing interests*

There is no conflict of interest/Competing interests.

### *Availability of data and material*

The data that support the findings of this study are available upon request.

### *Code Availability*

The computer program results are shared through the tables in the manuscript.

### *Authors' Contributions*

**Karolina Kokot:** Conceptualization, Methodology, Data Collection; Writing – original draft;

**Nikolina Dreven:** Conceptualization, Writing – literature review, editing and last version of manuscript, Administration;

**Marina Klačmer Čalopa:** Conceptualization; Writing – literature review and final editing

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