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Awareness and knowledge of transplantology among users of the ‘e-przeszczep’ mobile application. An analysis of a survey study

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Abstract

Introduction: The shortage of transplantable organs remains a major public health challenge due to limited societal awareness and knowledge. In line with World Health Organization recommendations on evidence-based digital health education, the ‘e-przeszczep’ mobile application was developed as an informational tool focused on transplantology. This study assesses self-reported awareness and knowledge of organ donation among users, highlighting the role of digital tools in supporting informed attitudes.

Aim: The study assesses self-reported awareness and knowledge of transplantology among users of the ‘e-przeszczep’ mobile application. It analyzes participants’ demographics, prior exposure to transplantology apps, and experiences with paper-based declarations of will. The study also evaluates perceived increases in awareness and knowledge after using the application.

Material and methods: An anonymous online survey assessed self-reported awareness and knowledge of organ transplantation among ‘e-przeszczep’ users and their socio-demographic profile. An original closed-ended questionnaire integrated with the application collected 262 responses between May and November 2025, excluding sensitive or identifiable data.

Results and discussion: The survey shows that ‘e-przeszczep’ mainly reaches adults aged 30–59, women, and users with higher education across all regions of Poland. For most respondents, it was their first transplantology app and increased awareness. Many had no prior paper-based declaration of will.

Conclusions: Users of ‘e-przeszczep’ are mainly adults aged 30–59 with secondary or higher education, including rural residents. For 95%, it was their first transplantology app, and 77% reported increased knowledge. The results highlight the application’s potential as an effective organ donation education tool.

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1. Introduction

The shortage of organs for transplantation remains a significant public health challenge, with levels of knowledge and societal awareness constituting key factors shaping attitudes toward organ donation. Digital solutions can support health education and facilitate access to reliable information. At the same time, the role of digital tools in health education is increasingly emphasized. The World Health Organization highlights that such solutions should be evidence-based and accessible to diverse population groups in order to avoid exacerbating health inequalities. In this context, the 'e-przeszczep' application was developed as an informational and educational tool focused on transplantology. The aim of this study is to describe the self-reported awareness and knowledge related to transplantology among application users and to characterize the respondent group based on survey data.

2. Aim

Assessment of self-reported awareness and knowledge levels regarding transplantology among users of the 'e-przeszczep' mobile application based on a survey study.

Based on this defined objective of the study, the following research questions were formulated:

(1) What is the demographic profile of the survey participants?
(2) What percentage of respondents report that 'e-przeszczep' was their first application related to transplantology?
(3) What percentage of users report an increase in awareness and knowledge after using the application?
(4) What experiences with the paper-based declaration of will do respondents have prior to using the application?

3. Material and methods

3.1. 'e-przeszczep' application

The 'e-przeszczep' mobile application is a web-based informational and educational tool designed to disseminate knowledge about transplantation in Poland. The application is publicly accessible and can be used via mobile devices and web browsers without the need to download or install it from an application store.

Its primary function is to provide structured information on the medical, legal, organizational, and social aspects of organ donation and transplantation. The content includes, inter alia, issues related to the Polish Transplantation Act, the presumed consent principle, deceased and living donation, contraindications to donation, procedures for determining brain death, qualification for transplantation, and post-transplant care. The application also contains thematic sections dedicated to specific organs.

In addition to its informational function, the application allows users to express electronic support for the idea of organ donation by completing a voluntary declaration. This feature is purely informational and symbolic in nature; it has no legal validity and is not registered in any external databases or official registries. Its purpose is to encourage users to reflect on their own attitudes toward organ donation and to discuss this topic with family members and close contacts.

The application does not provide medical advice, diagnostic tools, or clinical decision-support functionalities. It serves exclusively an educational and informational purpose.

During the study period, access to the application was free of charge and did not require user registration. No personal data or sensitive data were collected through the application.

The content of the application was developed in cooperation with a team of experts in the fields of transplantation, clinical medicine, and health sciences. The project was implemented as a scientific and educational initiative.

3.2. Methodology

The study was conducted using an anonymous online survey targeted at users of the 'e-przeszczep' mobile application, which serves as an educational tool on transplantology and enables, among other functions, the electronic endorsement of organ transplantation. The objective of the study was to assess self-reported awareness and knowledge of organ transplantation among application users and to determine the socio-demographic profile of this group. The research instrument was an original online questionnaire embedded on the project website and integrated with the 'e-przeszczep' application (www.e-przeszczep.pl). The questionnaire did not include questions about sensitive data or information that could identify participants. It covered, among others: demographics (age, gender, education, place of residence, voivodeship), questions regarding prior experiences with transplantology-themed applications and the paper-based declaration of will. All questions were closed-ended. The survey remains continuously available to 'e-przeszczep' users; this analysis includes 262 responses collected between May and the end of November 2025.

4. Results

Respondents indicated their age group at the initial stage of the survey. The data presented in Figure 1 demonstrate a clear predominance of individuals aged 45–59 years (45.0%, *n* = 118) and 30–44 years (35.9%, *n* = 94), who together constitute 80.9% (*n* = 212) of the study sample. In contrast, younger respondents aged 18–29 years accounted for 9.9% of participants (*n* = 26), while individuals aged 60 years and older represented 9.2% of the sample (*n* = 24). This age structure may suggest that the 'e-przeszczep' application was more frequently used by individuals in the working-age population, who are typically professionally active and more often engaged in health-related decision-making concerning themselves or their relatives. The relatively limited participation of younger respondents may be associated with a lower perceived relevance of transplantation-related topics within this age group, despite their generally high level of digital engagement. Similarly, the lower representation of older adults may potentially be linked to barriers related to the use of applications or a reduced inclination to participate in online surveys. As a result, it can be assumed that the findings primarily reflect the knowledge levels and attitudes of individuals aged 30–59 years, which should be taken into account when interpreting the results and when planning future educational or promotional activities aimed at underrepresented age groups.

Analysis of the gender distribution among respondents indicates that women constituted the majority of the study sample (57.6%, *n* = 151), while men accounted for a substantial proportion of participants (42.0%, *n* = 110). A very small fraction of respondents identified as 'other' (0.4%, *n* = 1), indicating minimal representation of non-binary gender identities in the survey (Figure 2).

The predominance of female respondents is consistent with patterns commonly observed in health-related research, where women tend to demonstrate higher engagement in preventive health initiatives, educational interventions, and online surveys. At the same time, the relatively high participation of men suggests that the 'e-przeszczep' application successfully reaches both major gender groups, which is particularly relevant in the context of organ transplantation awareness, where broad societal engagement is essential. The marginal representation of the 'other' category limits the possibility of drawing conclusions regarding gender-diverse users; however, its presence indicates that the survey allowed inclusive self-identification. Overall, the gender structure of the sample suggests that the findings primarily reflect the perspectives of women and men, and this should be taken into account when interpreting the results and considering future outreach strategies aimed at inclusivity.

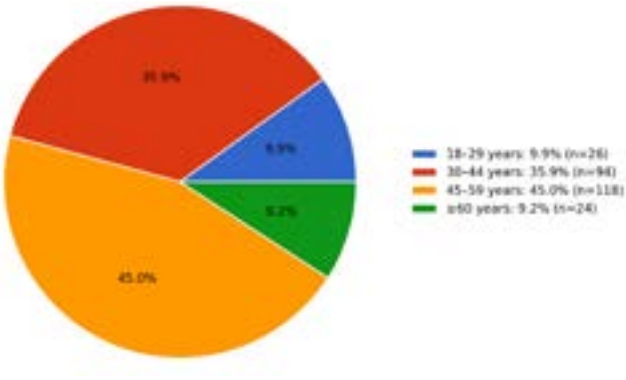

Figure 1. Age distribution of respondents (*n* = 262).

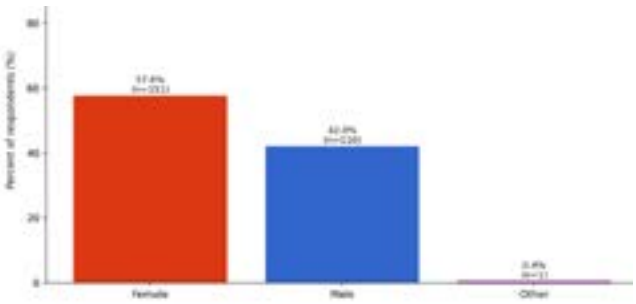

Figure 2. Gender of respondents (*n* = 262).

Analysis of respondents' educational attainment indicates that the largest proportion of the study sample consisted of individuals with higher education (53.8%, *n* = 141). This suggests that the 'e-przeszczep' application may be more frequently used by individuals with a higher level of educational capital, who are often more inclined to seek reliable health-related information and engage with educational digital tools. The second most numerous group comprised respondents with secondary education (30.5%, *n* = 80), representing a substantial segment of the user population and indicating that the application also reaches individuals with a moderate level of formal education. Participants with vocational education accounted for 11.1% of the sample (*n* = 29), which may reflect the application's accessibility across diverse educational backgrounds. Relatively small proportions of respondents reported primary education (3.4%, *n* = 9) or identified themselves as students (1.1%, *n* = 3). The limited representation of these groups may be associated with lower engagement in health-related topics among younger users or potential differences in how students perceive and classify their educational status. Overall, the educational structure of the sample suggests that the findings primarily reflect the perspectives of respondents with secondary and higher education, which should be taken into account when interpret-

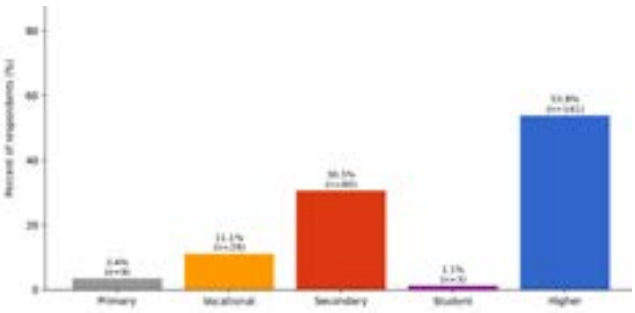

Figure 3. Education level of respondents (*n* = 262).

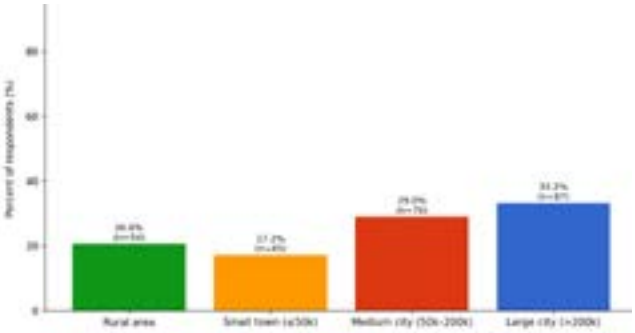

Figure 4. Place of residence (*n* = 262).

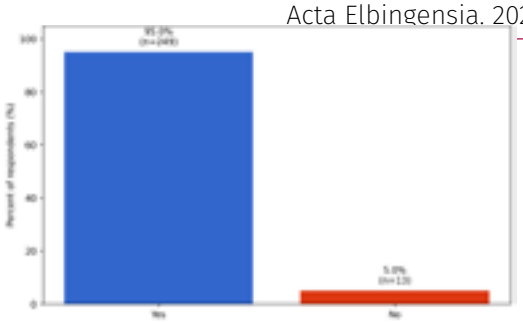

Figure 5. First contact with an organ transplantation – related application (*n* = 262).

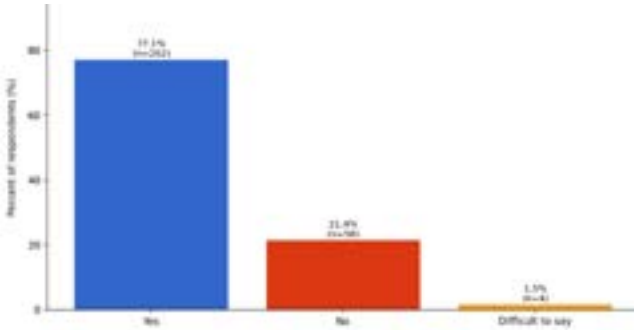

Figure 6. Perceived increase in awareness and knowledge after using the apllication (*n* = 262).

ing the results and when designing future educational strategies aimed at broadening the application's reach among less-represented educational groups (Figure 3).

Analysis of respondents place of residence, indicates that the 'e-przeszczep' application reached users from a wide range of settlement types. The largest proportion of respondents resided in large cities with more than 200,000 inhabitants (33.2%, *n* = 87), which may be associated with greater availability of digital infrastructure, higher levels of digital literacy, and increased exposure to health-related information in urban environments. A substantial share of participants also came from medium-sized cities with populations between 50,000 and 200,000 (29.0%, *n* = 76), suggesting that the application's reach extends beyond major metropolitan areas and is effectively adopted in regional urban centers. Respondents living in rural areas accounted for 20.6% (*n* = 54) of the sample, while individuals from small towns with up to 50,000 inhabitants represented 17.2% (*n* = 45). Together, these two groups constituted nearly 38% of all participants, indicating that the application was not limited to large urban populations and was accessible to users from less urbanized settings. Overall, this distribution suggests that the 'e-przeszczep' application can be considered a tool with broad geographical reach. It may be assumed that its digital form enables relatively equal access to transplant-related knowledge regardless of place of residence. Nevertheless, differences in participation levels between urban and rural areas should be taken into account when interpreting the results and when planning future dissemination or educational strategies aimed at strengthening engagement in smaller localities (Figure 4).

The distribution of responses regarding prior contact with organ transplantation–related applications indicates that for the vast majority of respondents (95.0%, *n* = 249), the 'e-przeszczep' application constituted their first encounter with a digital tool addressing transplantation issues. Only a small proportion of participants (5.0%, *n* = 13) reported previous experience with similar applications. This finding may suggest that access to digital educational resources dedicated to organ transplantation remains limited, and that the 'e-przeszczep' application fills an existing gap in this area. The high share of first-time users may indicate that the application effectively reaches individuals who had not previously sought or encountered such tools, potentially expanding societal exposure to transplantation-related knowledge (Figure 5).

At the same time, the low percentage of respondents with prior experience may reflect the relatively niche nature of transplantation-focused applications or limited awareness of their availability. Consequently, it can be assumed that 'e-przeszczep' plays an introductory role for many users, which underscores its potential importance as an initial point of contact for building awareness, shaping attitudes, and supporting informed decision-making related to organ donation.

Analysis of responses presented indicates that a substantial majority of participants perceived an in-

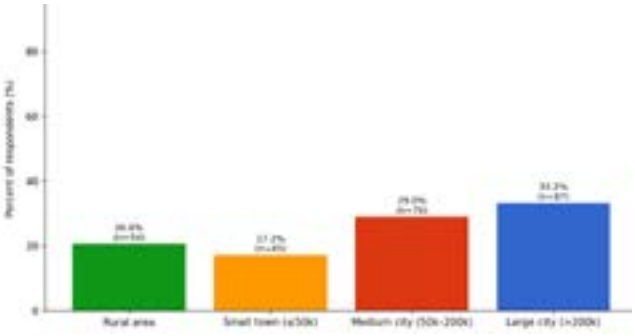

Figure 7. Previous completion of a paper-based declaration of will (*n* = 262).

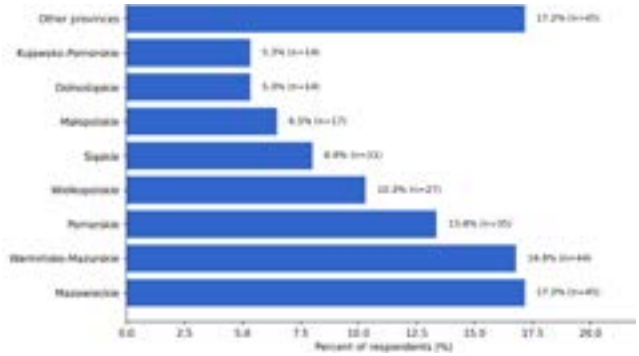

Figure 8. Province of residence (*n* = 262).

crease in their awareness and knowledge of organ transplantation after using the 'e-przeszczep' application (Figure 6). As many as 77.1% of respondents (*n* = 202) declared that the application contributed positively to their understanding of transplantation-related issues. In contrast, 21.4% of participants (*n* = 56) reported no perceived change in their level of awareness, while a small fraction of respondents (1.5%, *n* = 4) found it difficult to assess the impact of the application. This distribution suggests that the application may be effective as an educational tool for a large proportion of users, potentially supporting the dissemination of basic and intermediate knowledge on organ transplantation. At the same time, the presence of respondents who did not perceive an increase in awareness may reflect prior familiarity with the topic, individual differences in expectations, or varying levels of engagement with the application's content. The marginal proportion of respondents who were unable to assess the impact indicates that the application's educational effect was generally clear to users. Overall, it can be cautiously inferred that the 'e-przeszczep' application has the potential to enhance social awareness and knowledge regarding organ donation, particularly among users who may not have had structured access to such information before. However, the subjective nature of self-reported perception should be taken into account when interpreting these results, and further studies could explore objective measures of knowledge acquisition to complement these findings.

The responses concerning prior completion of a paper-based declaration of will indicate a varied level of previous engagement with formal organ donation procedures. As shown in Figure 7, the majority of respondents (62.6%, *n* = 164) declared that they had not previously completed a paper-based declaration of will. This suggests that for a substantial proportion of users, the topic of formally expressing consent or opposition to organ donation may not have been translated into concrete administrative action prior to using the application. At the same time, 37.0% of participants (*n* = 97) reported that they had completed such a declaration, indicating a relatively high level of prior awareness and involvement in transplantation-related decisions within this subgroup. A marginal proportion of respondents (0.4%, *n* = 1) indicated that they had completed the declaration earlier, which may reflect individual differences in interpreting the response categories rather than a distinct behavioral pattern. Overall, this distribution may suggest that the 'e-przeszczep' application reaches both individuals with prior experience in formal transplant-related decision-making and those who have not previously taken such steps. It can be assumed that, for the latter group, the application may serve as an initial stimulus encouraging reflection on personal attitudes toward organ donation and potentially lowering barriers to future formal declarations. In this context, the application may contribute to bridging the gap between general awareness and concrete civic or health-related actions, thereby supporting informed decision-making at the societal level.

Respondents' answers indicate that the majority of users of the 'e-przeszczep' application had not previously completed a paper-based declaration of will regarding organ donation. A lack of prior experience with such a document was reported by 62.6% of participants (*n* = 164), suggesting that formal expression of consent for organ donation remains relatively uncommon within the surveyed population. At the same time, 37.0% of respondents (*n* = 97) declared that they had completed a paper declaration of will, which indicates the presence of a substantial group already engaged in transplant-related decision-making. Only 1 respondent (0.4%, *n* = 1) reported having completed such a declaration earlier, which represents a negligible proportion of the sample. This distribution of responses may reflect limited formal involvement of the general public in transplantology-related procedures, despite the long-standing legal framework of presumed consent in Poland. The absence of prior declarations among most respondents could potentially be associated with insufficient knowledge,

organizational or procedural barriers, reluctance toward formal documentation, or a lack of clear information on how and where such declarations can be submitted. From the perspective of the societal impact of the project, the high proportion of individuals without prior experience in completing a declaration of will suggests that the 'e-przeszczep' application reaches users who had not previously undertaken concrete actions in this area. In this context, the application may be assumed to serve an activating and facilitating role, encouraging reflection on personal attitudes toward organ donation and lowering barriers to formal expression of one's will.

At the same time, the participation of respondents who had already completed a paper-based declaration indicates that the application is also used by individuals with prior engagement in transplantology, for whom it may function as a tool reinforcing existing knowledge and supporting informed decision-making. Overall, these findings suggest that the application has the potential to contribute to shaping informed societal attitudes and to reducing psychological and organizational obstacles related to organ donation decisions.

5. Discussion

Public Opinion Research Center (Centrum Badania Opinii Społecznej – CBOS) surveys conducted in 2012 and 2016 consistently demonstrate high levels of public support for organ transplantation in Poland. A vast majority of adult Poles (80%) declare their consent to post-mortem organ donation, marking a significant increase in approval compared to previous years. (Centrum Badania Opinii Społecznej, 2012; 2016). Despite these optimistic declarations, the practical implementation of donation continues to encounter significant barriers. According to the 2022 Poltransplant report, although donation activity is gradually returning to pre-pandemic levels (with procurements carried out in 123 hospitals), formal engagement remains low, and the potential of many donors is not being fully realized (Narodowe Centrum Transplantacji POLTRANSPLANT, 2022). A primary obstacle is the lack of communication within families and low legal literacy specifically, the lack of awareness regarding the principle of presumed consent which contributes to persistent family objections during critical decision-making moments (Centrum Badania Opinii Społecznej, 2016).

Education plays a crucial role in addressing this issue, particularly among groups with lower levels of health literacy. Research has shown that interactive educational programs incorporating videos, quizzes, and registration simulations significantly increase the willingness to become a donor and encourage discussions with relatives, effectively debunking procedural and emotional myths. Importantly, this effect is lasting and independent of demographic variables (Steenaart et al., 2019). Recent analyses confirm that higher levels of health literacy positively correlate with donation awareness, highlighting the necessity of implementing programs that enhance patient self-control (Huseynov; Satici, 2025).

In the Polish context, where the pandemic has accelerated the development of e-health services, digital health literacy (eHL) has become particularly significant. Wojcieszko and Duplaga define eHL as the ability to search for, understand, and most importantly critically evaluate health information from online sources. Research conducted in Poland indicates a disparity in these skills: while younger women demonstrate a sufficient level (averaging 29.46 points on the eHEALS scale), individuals over the age of 50 often struggle with problematic levels (25.26 points). The authors emphasize that proficiency in navigating the digital health landscape is essential for the effective use of tools such as the Online Patient Account (Internetowe Konto Pacjenta – IKP), where citizens can manage their declarations of intent. Nursing staff represent a vital link in this process; as a trusted group with close patient contact, they can serve as educators regarding reliable digital sources of information on transplantation (Wojcieszko; Duplaga, 2023). This approach is fully aligned with WHO (2019) recommendations, which advocate for the implementation of digital solutions to increase the accessibility of healthcare systems. Adopting these models would allow the stable public support reported by CBOS to be translated into a tangible increase in donor registrations, making full use of the existing legal framework.

6. Conclusions

(1) The users of the 'e-przeszczep' application were mainly individuals aged 30–59 years, most often with secondary or higher education. A notable proportion of respondents lived in rural areas and small towns.
(2) For 95% of respondents, the application was their first contact with digital education related to transplantology.
(3) Most participants (77.1%) reported an increase in knowledge and awareness after using the application.
(4) The results suggest that the 'e-przeszczep' application may have potential as a tool for health education and for shaping attitudes toward organ donation.

CONFLICT OF INTEREST
None declared.

FUNDING
None declared.

ETHICS
Not applicable.

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