DOCTORAL THESIS

Economic Evaluation of Peer Support Programs: Addressing the Second Victim Phenomenon in the German Healthcare System

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This doctoral thesis, entitled **"Economic Evaluation of Peer Support Programs: Addressing the Second Victim Phenomenon in the German Healthcare System"**, is submitted under the format of **thesis by compendium** of the following **publications**:

LIST OF STUDIES

Two scientific articles were developed as a result of achieving the objectives of this doctoral thesis.

- **Study I. "Economic Value of Peer Support Program in German Hospitals"**

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- **Study II. "The Economic Implications of Psychosocial Peer Support for Health Workers in German Hospitals"**

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Dr. Francisco Javier Moreno Hernández, Coordinator of the Doctoral Programme in **Sports and Health**

REPORTS:

That **Hannah Roesner** has performed, under the supervision of our Doctoral Programme, the work entitled **"Economic Evaluation of Peer Support Programs: Addressing the Second Victim Phenomenon in the German Healthcare System"** pursuant to the terms and conditions established in the Research Plan and following the Code of Good Practices of the Miguel Hernández University of Elche, successfully meeting the objectives planned for its public defence as a doctoral thesis.

In witness whereof I sign for all pertinent purposes, in ..... on ..... 2025.

Coordinator of the Doctoral Programme in Sports and Health

Prof. Dr. Francisco Javier Moreno Hernández

Dr. José Joaquín Mira Solves, director of the doctoral thesis entitled **"Economic Evaluation of Peer Support Programs: Addressing the Second Victim Phenomenon in the German Healthcare System"**

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Thesis director

Prof. Dr. José Joaquín Mira Solves

Content Structure

Abstract

Healthcare systems worldwide, including Germany's, face critical workforce challenges, such as high rates of burnout, absenteeism, and turnover among medical and nursing staff. A key contributor to these issues is the Second Victim Phenomenon (SVP), in which healthcare workers (HCWs) are negatively impacted by adverse patient events, unintentional medical errors, or patient harm. SVP has been associated with reduced job performance, increased sick leave, and higher rates of staff turnover, resulting in substantial financial burdens on healthcare institutions. While peer support programs (PSPs) have been shown to mitigate the negative effects of SVP, their economic impact has not been thoroughly examined. Understanding the financial impact of PSPs is essential for designing strategies that improve workforce retention and support the long-term sustainability of healthcare systems.

This doctoral thesis aims to assess the financial implications of PSPs in mitigating the effects of the SVP on HCWs with a focus on reducing absenteeism and improving staff retention. To achieve this objective, two correlational studies were conducted to evaluate the economic impact of PSPs within the German healthcare system.

Both studies used a conservative approach and employed economic evaluation methods to quantify the financial burden of SVP and the potential cost savings associated with PSP implementation. In Study I, a Markov model was utilized to compare cost scenarios with and without PSPs over a one-year period in a German scenario hospital with 1,000 employees. Direct costs, including absenteeism and staff turnover, were analyzed. Study II broadened the scope and assessed the national economic implications of PSPs by employing a comprehensive methodological approach and using data from the SeViD studies, which examined the prevalence and time of recovery of SVP among German physicians and nurses. Economic impact assessments were conducted to estimate the potential cost savings associated with implementing a PSP.

The results of both studies highlight the significant financial benefits of implementing PSPs to mitigate SVP among HCWs in Germany. At the hospital level, PSPs have been shown to decrease expenses associated with absenteeism and staff turnover, resulting in average cost saving of €6,672 per HCW and total annual savings of approximately €6.67 million in the hospital scenario.

Staff turnover decreased from 14.3% to 5.8% and absenteeism declined moderately with sick days decreasing from 6,766 to 6,141 annually. On a national level, absenteeism and staff replacement costs amount to €1.56 billion annually for physicians and €1.87 billion for nurses. Implementing a nationwide PSP could significantly reduce these expenses by lowering absenteeism and staff turnover, with projected savings of €1.55 billion per year for the healthcare sector.

This doctoral thesis fills a critical gap in the literature by quantifying the economic burden of SVP and assessing the cost-effectiveness of PSPs in Germany. The economic analyses conducted in this thesis provide compelling evidence that structured peer support initiatives yield significant financial benefits. Beyond substantial cost savings, PSPs play a vital role in strengthening the healthcare workforce by fostering a supportive environment that enhances staff well-being, patient safety, and institutional stability. The findings of this thesis highlight the need for nationwide PSP implementation and greater awareness of SVP's impact on HCWs and institutions. Investing in HCWs well-being not only improves workforce retention but also helps hospitals balance financial sustainability with high-quality patient care, ultimately contributing to a more resilient healthcare system.

Resumen

Los sistemas de salud en todo el mundo, incluida Alemania, enfrentan importantes desafíos con respecto a la fuerza laboral, como altas tasas de agotamiento, ausentismo y rotación de personal entre el personal médico y de enfermería. Uno de los factores clave es el Fenómeno de la Segunda Víctima (FSV), por el que los trabajadores de la salud (TS) se ven negativamente afectados por eventos adversos en pacientes, errores médicos involuntarios o curso inesperado de los pacientes. El FSV se ha asociado con una disminución en el rendimiento laboral, un aumento en las bajas por enfermedad y mayores tasas de rotación de personal, lo que genera cargas financieras evitables para las instituciones sanitarias. Aunque los programas de apoyo entre pares (PAP) han demostrado mitigar los efectos negativos del FSV, su impacto económico no ha sido examinado en profundidad. Comprender la repercusión financiera de los PAP es esencial para diseñar estrategias que mejoren la retención del personal y respalden la sostenibilidad a largo plazo de los sistemas de salud.

Esta tesis doctoral tiene como objetivo evaluar las implicaciones financieras de los PAP a la hora de mitigar los efectos del FSV en los TS, con un enfoque en la reducción del absentismo y la mejora de la retención del personal. Para lograr este objetivo, se llevaron a cabo dos estudios que evaluaron el impacto económico de los PAP en el sistema de salud en Alemania.

Ambos estudios adoptaron un enfoque conservador y emplearon métodos de evaluación económica para cuantificar la carga financiera del FSV y los posibles ahorros de costos asociados con la implementación de los PAP. En el Estudio I, se utilizó un modelo de Markov para comparar escenarios de costos con y sin PAP durante un período de un año en un hospital alemán con 1,000 empleados. Se analizaron los costos directos, incluidos el absentismo y la rotación de personal. El Estudio II amplió el alcance y evaluó las implicaciones económicas a nivel nacional de los PAP mediante un enfoque metodológico integral y utilizando datos de los estudios SeViD, que examinaron la prevalencia y duración del FSV entre médicos y enfermeros en Alemania. Se realizaron evaluaciones del impacto económico para estimar los posibles ahorros de costos derivados de la implementación de un PAP.

Los resultados de ambos estudios destacaron los importantes beneficios financieros de la implementación de los PAP para mitigar el FSV entre los TS en Alemania. A nivel hospitalario, se ha demostrado que los PAP reducen los gastos asociados con el absentismo y la rotación de personal, generando un ahorro promedio de 6,672 € por TS, lo que equivale a un ahorro anual total de aproximadamente 6.67 millones de euros en el hospital analizado. La rotación de personal disminuyó del 14.3% al 5.8%, y el absentismo se redujo moderadamente, con una disminución de días de baja por enfermedad de 6,766 a 6,141 anualmente. A nivel nacional, los costos del absentismo y la sustitución de personal ascienden a 1.56 mil millones de euros anuales para médicos y 1.87 mil millones de euros para enfermería. La implementación de un PAP a nivel nacional podría reducir significativamente estos gastos al disminuir el absentismo y la rotación de personal, con un ahorro proyectado de 1.55 mil millones de euros anuales para el sector de la salud.

Esta tesis doctoral reduce una brecha crítica en la literatura al cuantificar la carga económica del FSV y evaluar la rentabilidad de los PAP en Alemania. El análisis económico realizado en esta investigación proporciona evidencia contundente de que las iniciativas estructuradas de apoyo entre pares generan beneficios financieros significativos. Más allá de los ahorros sustanciales en costos, los PAP desempeñan un papel fundamental en el fortalecimiento de la fuerza laboral en el ámbito sanitario, fomentando un entorno de apoyo que mejora el bienestar del personal, la seguridad del paciente y la estabilidad institucional. Los hallazgos de esta tesis subrayan la necesidad de implementar PAP a nivel nacional y de generar una mayor concienciación sobre el impacto del FSV en los TS y en las instituciones. Invertir en el bienestar de los TS no solo mejora la retención del personal, sino que también ayuda a los hospitales a equilibrar la sostenibilidad financiera con una atención de alta calidad para los pacientes, contribuyendo en última instancia a un sistema de salud más resiliente.

Part A: Introduction

1. The Second Victim Phenomenon

Healthcare workers (HCWs) are the foundation of the global healthcare system and play an essential role in providing critical healthcare services. In Europe alone, the healthcare sector accounts for over 10% of total employment, with this share steadily increasing as demand for healthcare services grows (1). The well-being of this workforce is not only essential to maintaining the quality of care, but is also an ethical and legal priority for healthcare providers (2). Ensuring optimal working conditions benefits employees and leads to better patient outcomes and higher quality of service overall.

However, HCWs frequently encounter high-stress scenarios and emotionally charged situations, ranging from patient injuries and fatalities to violence in the workplace. The already significant physical and psychological burdens of their role have intensified in the context of the COVID-19 pandemic, highlighting the acute vulnerabilities of HCWs (3, 4). High-Impact Events (HIEs), characterized by their emotionally distressing nature, pose a profound challenge not only to individual HCWs but also to the broader healthcare system. These incidents have been increasingly identified as significant contributors to absenteeism, reduced job performance, and professional departures in the healthcare workforce (5, 6).

This vulnerability among HCWs is mirrored in the patient safety domain, where adverse events impact an estimated 10% of patients during medical care, according to the World Health Organization's Global Patient Safety Action Plan (7). The influential report *"To Err is Human: Building a Safer Health System"* by the Institute of Medicine (8) emphasizes that human error plays a significant role in these incidents, underscoring the critical need to support HCWs in reducing errors and improving patient safety. Addressing this issue is essential not only to prevent harm to patients but also to safeguard the well-being of healthcare staff, who can be profoundly impacted by involvement in such errors (9).

1.1 Second Victim Definition

As patient safety and associated risk factors in healthcare have come under increasing scrutiny, it has become evident that HCWs involved in clinical errors frequently experience a range of emotional and psychological challenges. These include shame, guilt, emotional distress, post-traumatic stress, insomnia, nightmares, reduced self-confidence, burnout, and depression, ultimately identifying them as *"Second Victims"* (SVs) (10–12).

In the context of the psychological burden experienced by HCWs after errors in patient care, the term Second Victim (SV) was first introduced by the American internist Albert W. Wu in 2000 (13). This concept initially described physicians who, after committing a medical error, became emotionally traumatized, thereby making them the SVs of the event, while patients and their families were considered the *"first victims"* (13). Since its inception, growing attention has been paid to the Second Victim Phenomenon (SVP), leading to refinements and expansions of the definition. While the term originally focused on the fallibility of HCWs despite their best intentions and diligent actions, Scott et al. broadened its application in 2009 to encompass other traumatic events and professional experiences occurring within the scope of patient care (14). This expanded definition characterizes SVs as HCWs traumatized by unexpected patient-related incidents posing a risk to patient safety, such as medical errors, or patient injuries (14). More recently, the European Researchers' Network Working on Second Victims (ERNST) refined and updated the definition, culminating in an evidence- and consensus-based definition published in 2022 (15). A Second Victim is now defined as *"any healthcare worker, directly or indirectly involved in an unanticipated adverse patient event, unintentional healthcare error, or patient injury, and who becomes victimized in the sense that they are also negatively impacted."*

The SVP has brought greater awareness to the fact that HCWs and healthcare organizations are also affected by adverse events (15). Recognizing this concept can help affected individuals cope more effectively with such incidents while validating their emotional and psychological experiences (15). Moreover, this recognition provides organizations with an opportunity to develop targeted support for impacted staff and to work toward the cultural shifts needed to prioritize patient safety and person-centred care (16, 17). Many adverse events in healthcare settings are primarily attributed to systemic, strategic, or organizational flaws beyond the

control of individual HCWs. Within this broader systemic context, it is reasonable to classify affected staff as SVs (18).

Despite its broad adoption since its introduction by Wu in 2000, the term SV has not been without criticism (15, 16, 19). Critics of the terminology argue that the use of the term *"victim"* may convey traditional connotations that diminish the responsibility of healthcare providers for ensuring safe practice while potentially overshadowing the systemic roots of patient harm (16). Concerns have been raised that the term *"victim"* could imply patient harm is an inevitable or unchangeable outcome, potentially fostering passivity rather than encouraging solutions to address the underlying causes (16, 19). Moreover, some critics worry that the terminology could create the impression that HCWs are disproportionately focused on their own emotional needs, rather than prioritizing patient safety (20). Nonetheless, a panel of international experts strongly endorsed retaining the term in 2017 due to its increasing acceptance by various stakeholders in healthcare, including policymakers and providers (21).

1.2 Impact and Prevalence of the Second Victim Phenomenon

HCWs often experience profound physical and emotional consequences following patient safety incidents. Common physical effects include troubling memories, anxiety, sleep disturbances, and distress (22). Emotional responses such as self-directed anger, regret, anxiety, fear of future errors, embarrassment, and feelings of guilt are also frequently reported (22). These reactions can lead to diminished job satisfaction, reduced self-confidence in professional abilities (23), intentions to leave their job (24), absenteeism (6), and, in severe instances, even suicide (25, 26).

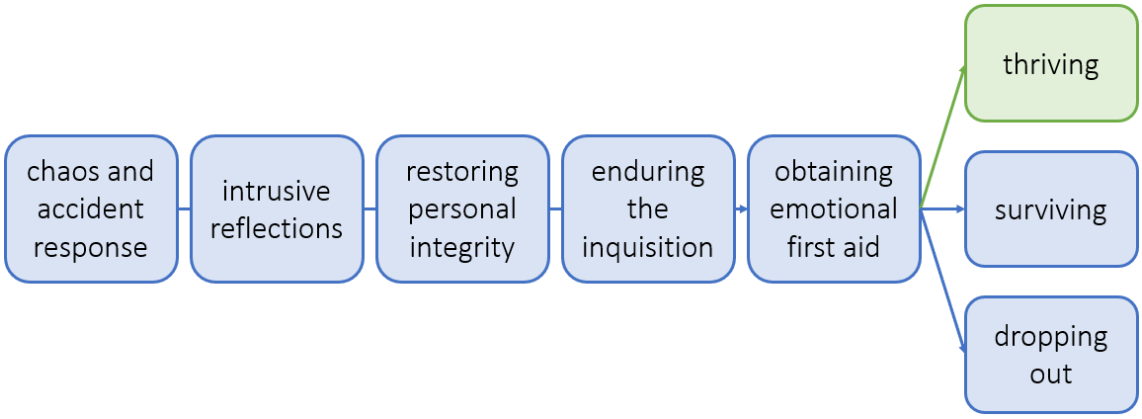
The SVP not only impacts the well-being of the affected individuals but also poses risks to the quality of care delivered to future patients (27). These risks can manifest in several ways, including an increased tendency toward defensive medical practices (28, 29) or increased likelihood of medical errors, particularly in cases where post-traumatic stress disorder (PTSD) develops among HCWs (23, 30). Defensive medicine, driven by a desire to avoid further errors or legal repercussions, may hinder optimal decision-making and lead to inefficient resource

utilization. A cross-sectional study conducted in Spain's primary care sector identified defensive medicine as the leading cause of medical overuse, accounting for 40% of reported cases (31). Furthermore, the psychological toll of SVP, such as PTSD, has been associated with impaired judgment and heightened stress levels, further jeopardizing patient safety (23, 27).

The SVP is a widespread issue in healthcare, that occurs in all settings and affect all health and care professions. In this context, a Croatian pilot study among different groups of medical staff indicated that the perception of adverse events does not appear to be influenced by their qualifications (32). A systematic review by Seys et al. estimates the prevalence of SVP between 10% and 43% (11). However, more recent studies suggest higher prevalence rates, ranging widely between 10% and 72.6% (11, 33, 34). Other experts assume that a significant proportion of HCWs encounter the SVP at least once in their careers (30). Research conducted in German-speaking countries has provided extensive empirical data on this phenomenon (35–39). The SeViD project (Second Victims in German-speaking countries) shed light on the frequency and outcomes of the SVP among HCWs including physicians, nurses, emergency medical services physicians, paediatricians, general practitioners, and healthcare assistants. The prevalence rate among physicians and nurses was found to be 59-60%, (35, 36) – a figure consistent with global trends.

Scott et al. described the typical course of the SVP in six phases (**Figure 1**) (14, 25): it starts with a chaos and accident response (1), followed by intrusive reflections (2), restoring personal integrity (3), enduring the inquisition (4), obtaining emotional first aid (5) and finally moving on (6). These phases do not have to be gone through one after the other; loops are possible, so that those affected can relapse into phases. Likewise, the phases cannot be assigned fixed time intervals that specify the duration of the respective stages. In the end, the recovery process may lead SVs down paths of dropping out, surviving, or thriving (14, 25):

Figure 1 *Typical course of Second Victim Phenomenon (own illustration after Scott et al. (14))*



These outcomes can influence job satisfaction, workplace attendance, or even lead to career abandonment (14, 25, 33). The more serious the patient harm, the longer the emotional impact on healthcare providers (40). Recovery trajectories for SVs often vary widely, depending on the severity of the case, the personal resources of the person affected, but also the help and support provided by members of the treatment team and superiors. The situation can be managed in different ways potentially resulting in outcomes such as leaving the profession entirely, coping in a neutral state, or achieving a more positive, resilient outlook (14, 25).

1.3 Economic Consequences of Absenteeism and Turnover in the Healthcare Workforce due to Second Victim Phenomenon

The impact of severe incidents on HCWs extends beyond individual harm, leading to substantial financial strain on healthcare organizations. The SVP presents a particular challenge, as affected individuals may cope by staying away from work (absenteeism), continuing to work in a dysfunctional manner (presenteeism), or leaving their position entirely (turnover). Absenteeism, whether voluntary or involuntary, worsens existing staff shortages and disrupts the continuity of care (41). Conversely, presenteeism occurs when employees continue working despite physical or psychological strain (42), leading to decreased concentration, impaired performance, and a higher risk of errors (41).

The economic burden caused by absenteeism and presenteeism in healthcare is substantial, with direct implications for productivity and patient safety. Mental health conditions are a leading cause of absenteeism in the healthcare sector among nursing staff (43). In Germany, for instance, 2022 data revealed an average of 434 mental health-related sick days per 100 employees in healthcare, compared to an all-sector average of 301 days (44). Such disparities highlight the heightened vulnerability of HCWs to stress-related conditions and the associated economic costs.

Turnover represents another significant economic burden. Nurse turnover, which is a critical issue in healthcare, results in both the loss of expertise and reduced workforce productivity (45–47). Replacing a permanently incapacitated employee can cost up to 30% of their annual salary, with higher financial implications for senior roles. For example, filling a senior physician vacancy takes an average of 100 days, incurring replacement costs exceeding €120,000 (48, 49). Beyond financial costs, turnover disrupts care delivery, leads to the loss of institutional knowledge, and compromises workforce morale, further compounding the challenges faced by healthcare systems.

Studies by Burlison et al. and Mahat et al. have shown that distress related to the SV-experience significantly influences work-related outcomes, driving higher rates of absenteeism and turnover intentions (5, 6). In addition to its impact on the workforce, patient harm has far-reaching economic consequences, reducing global economic growth by an estimated 0.7% annually and generating indirect costs amounting to trillions of US dollars each year (50). Investments in initiatives to reduce patient harm offer not only financial savings but also improved outcomes for patients and healthcare systems alike (51). Research suggests that effectively engaging patients in their care can reduce the burden of harm by up to 15%, providing a clear return on investment (52). These findings emphasize the interconnectedness of patient safety, workforce well-being, and financial sustainability.

2. Peer Support Programs

Over the past two decades, extensive research has highlighted the prevalence and impact of the SVP, emphasizing the urgent need for effective interventions. Organizational support plays a crucial role in reducing these negative outcomes, underscoring the need for structured support mechanisms (6). Peer Support Programs (PSPs) have emerged as a vital response to these challenges, helping to mitigate the psychological burden on HCWs, reduce absenteeism, and strengthen organizational resilience. By offering timely and structured assistance, PSPs not only support recovery but also foster professional growth and confidence. Despite growing awareness, conceptual development remains limited (15), and many healthcare organizations struggle to implement structured support systems. Due to the potentially serious consequences of patient safety incidents that can trigger the SVP, the World Health Organization's Strategy 4.4 in the Global Action Plan for Patient Safety 2021-2030 calls for healthcare facilities to ensure that HCWs "*are given ongoing psychological and other support in the aftermath of a serious patient safety incident*" (7). However, a significant gap persists in knowledge and resources needed to implement effective strategies for managing the psychological and emotional repercussions of such events, leaving many institutions unprepared to address SVP effectively (10, 53).

2.1 Main Characteristics of Support Programs

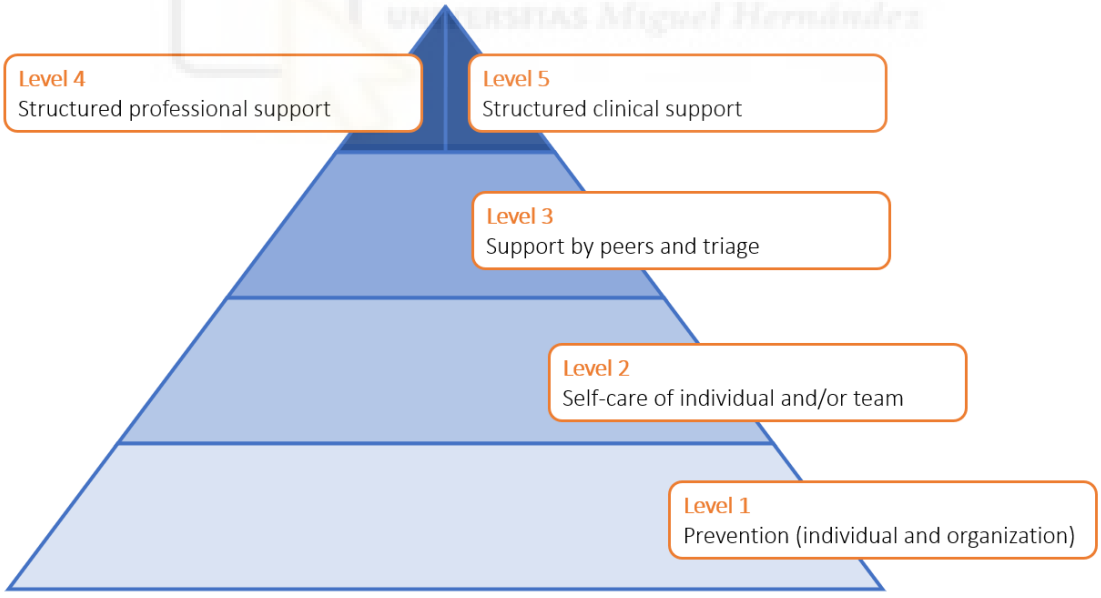
Support programs play a crucial role in this process by providing a structured framework for HCWs to process and recover from emotionally distressing incidents. By fostering a culture of safety and promoting comprehensive training for HCWs and healthcare managers, these programs empower staff to navigate challenges more effectively and reduce the negative impact of patient safety incidents (54). Educational initiatives focusing on SVP and patient safety have further highlighted the importance of equipping HCWs with the tools necessary to manage these challenges (55).

Scott et al. (2009) emphasize the critical need for immediate and effective oversight and support strategies to mitigate the adverse impact on SVs (14, 25). To address this, support programs

should follow a structured, graduated approach that provides both local and organization-wide measures, ensuring accessible contact points at multiple levels of the intervention. One of the foundational frameworks for such support is Scott's three-stage intervention model, which outlines a tiered approach to assisting HCWs affected by patient safety incidents. This model consists of department-level support and leadership mentoring (Tier 1), peer support by trained colleagues (Tier 2), and access to professional resources for more complex needs (Tier 3) (56).

The primary objective of Scott's model is to provide tailored support based on the severity and individual needs of the affected HCW, ensuring a comprehensive and responsive support system (56). Building upon this concept, the ERNST consortium further refined the model in 2023 to address evolving challenges in healthcare (57). Seys et al. (2023) proposed an expanded framework (**Figure 2**) that organizes support programs across five levels: starting with preventive actions, followed by self-care for HCWs, peer support, structured professional support, and clinical support (57).

Figure 2 *Modified version of the five-step model (own illustration after Seys et al. (57))*



The systematic review by Busch et al. (2021) about SV Support Resources highlights that SV support in healthcare organizations is typically provided by internal peers and is characterized by voluntary, confidential, and readily available assistance (10). Most programs offer both one-on-one and group support while some only provide individual support (10). Identification of affected staff is primarily based on self-reporting and peer identification, though some programs adopt proactive measures by monitoring adverse events and involved personnel (10). Peer

supporter training is generally required, but only a few programs include ongoing training and regular debriefings (10).

2.2 Successful Examples of Peer Support Programs

Several international programs have emerged as effective models for addressing the needs of HCWs, fostering resilience, and enhancing workplace satisfaction.

The project Resilience In Stressful Events (RISE), developed at Johns Hopkins Hospital and introduced hospital-wide in 2012, offers a structured and proactive approach to supporting HCWs in distress (58). The program provides psychological first aid within 12 hours of an unexpected event, ensuring a timely and compassionate intervention. RISE employs a peer-support model, where trained colleagues offer both one-on-one and group counseling to SVs. This approach not only facilitates emotional recovery but also fosters a culture of mutual support and understanding within healthcare settings. The increasing rate of utilization indicates that the program has been well received by the workforce; in its first year, RISE received approximately one call per month, which quadrupled by the fourth year following a targeted awareness campaign. RISE has demonstrated a positive impact in mitigating emotional distress and reinforcing professional resilience (58).

In addition to RISE, other prominent programs have demonstrated success in supporting SVs. The Medically Induced Trauma Support Services (MITSS) program, established in Boston in 2002, provides comprehensive resources for patients, families, and HCWs affected by adverse events (59). MITSS offers a 10-module toolkit designed to help healthcare organizations implement customized support services, addressing various aspects of emotional recovery and institutional readiness.

Similarly, the forYOU program, developed at the University of Missouri Health Care, focuses on crisis intervention and stress management (56). The forYOU team, composed of trained HCWs and volunteers, provides immediate emotional first aid and ongoing support. Five years after its implementation, the program had supported over 1,000 HCWs, reflecting its crucial role in promoting a supportive workplace culture (60).

The Mitigating Impact in Second Victims (MISE) program is an online initiative developed in Spain in 2017 and differs from existing support programs by its preventive nature in relation to the SVP (53). Its primary goal is to increase awareness of the challenges experienced by SVs and to equip them with the necessary tools to cope with their emotional responses. The program offers an open-access online platform with educational content that covers the nature of patient safety incidents, various support mechanisms available, and steps HCWs can take to navigate the aftermath effectively. Through its structured approach, the MISE program helps HCWs build resilience and maintain their well-being while continuing to perform their duties. By utilizing this resource, HCWs can better understand the emotional toll of such events and develop strategies to manage stress (53).

The Kollegiale Hilfe (KoHi) program, implemented at a hospital in Austria in 2019, is a peer-support initiative designed to help healthcare staff cope with emotionally challenging events (61, 62). The program is built on a structured, step-by-step approach, emphasizing proactive psychological support by trained peers within the hospital setting. It offers a confidential, low-threshold access to assistance, ensuring that affected employees receive timely emotional and psychological support. The program integrates structured training, awareness-raising campaigns, and a follow-up evaluation system to measure its impact and effectiveness. A study on peer supporters' experiences in assisting SVs revealed that they perceived the sessions as highly beneficial for their colleagues while experiencing minimal burden themselves afterward (62).

Evaluations using validated tools such as the second victim experience and support tool (SVEST) (63, 64) underscore the importance of structured support programs in mitigating the financial and emotional toll of healthcare-induced events (60, 65). They also contribute to improved organizational resilience and a higher quality patient care. As healthcare institutions increasingly recognize the value of these initiatives, adopting best practices like those demonstrated by the RISE program can play a pivotal role in supporting their workforce as well as ensuring sustainable and compassionate healthcare environments. Initial studies utilizing validated tools such as SVEST suggest that these programs, when integrated with a Just Culture approach, can help mitigate the SVP. A recurring theme among these programs is the integration of support mechanisms within a Just Culture framework, which promotes open communication, learning from adverse events, and reducing punitive responses (66). By fostering a culture of

psychological safety, these programs help reduce absenteeism, prevent professional departures, and enhance overall patient safety.

2.3 The Critical Role of Peers in Supporting Second Victims

Peers are colleagues who share similar professional experiences and deeply understand the unique challenges of the healthcare environment. Their shared background makes them particularly well-positioned to provide timely and empathetic support to colleagues who have experienced emotionally distressing events (67). Unlike external resources, peers are inherently aware of the pressures and emotional toll associated with adverse events in healthcare, making them more approachable and credible sources of support (67). Through their direct experience, they can offer emotional assistance in a relatable, accessible, and non-judgmental manner, creating a safe space for affected individuals to express their feelings and concerns (67).

Peers play a crucial role in fostering resilience and promoting workforce retention within healthcare organizations. By providing structured yet informal support, they help alleviate well-being challenges while also mitigating economic pressures on healthcare systems (10, 67). Peer supporters are integral in ensuring that those affected by adverse events receive immediate psychological first aid, helping to prevent long-term consequences such as burnout, absenteeism, and professional disengagement (67). Additionally, peer support fosters a culture of openness and solidarity, encouraging professionals to seek help without fear of stigma or negative repercussions. Support programs involving peers have become widely recognized as an effective method for helping HCWs cope with the emotional and psychological aftermath of high-impact events (10).

PSPs are typically embedded within healthcare institutions and facilitated by internal peers who provide immediate and empathetic assistance (10). These programs are structured to ensure that peer supporters receive adequate training to recognize distress and offer timely interventions. Their design includes clear procedures for access, making support freely available at any time, thereby ensuring that HCWs in need can rely on a well-defined system of assistance (68). Furthermore, these programs incorporate coping strategies, time for reflection, and

options for time off following adverse events, all of which contribute to the overall effectiveness of peer support (68, 69).

Research has shown that SVs mostly prefer support programs that involve peers. They value individual support from a trusted, trained peer within a few days of the incident, though the timing of support may vary depending on the severity of the event (58, 65). Participants have indicated that peer support should be regular, freely accessible, and available at any time, with clear guidelines for accessing help (68, 69). Furthermore, SVs appreciate multidisciplinary support that includes executive leadership alongside colleagues (65, 68, 69). Empathy from colleagues is also a crucial element in the support process (53). Additionally, some SVs express the desire to understand how healthcare institutions will learn from patient safety events and implement changes to prevent recurrence, highlighting the importance of sustainable support measures (53, 70). The preference for peer support is reinforced by multiple studies, including the SeViD studies, which found that 82% of respondents in SeViD I and 49% in SeViD II sought support from colleagues, making it the most frequently chosen form of assistance (35, 36). Similarly, Scott et al. reported that debriefing among colleagues after a potentially traumatizing event suffices as support for approximately 60% of those involved (56). Furthermore, the Kollegiale Hilfe (KoHi) program has demonstrated that peers are particularly well-suited to providing timely and empathetic support in a non-judgmental environment (61, 62). The effectiveness of collegial support is further validated by various studies, underscoring its critical role in promoting emotional recovery and maintaining professional well-being within healthcare settings (64, 71, 72).

Support programs involving peers have gained increasing recognition in the healthcare industry. The Joint Commission, a leading accrediting body in the United States, advocates for the implementation of structured PSPs as a proactive measure to mitigate the impact of adverse events (73, 74). Studies have shown that healthcare providers predominantly seek support from colleagues and personal networks rather than formal professional services (75). Peer support consistently emerges as the most preferred intervention among SVs, emphasizing its essential role in promoting emotional resilience among HCWs.

2.4 Benefits of Peer Support Programs for Second Victims

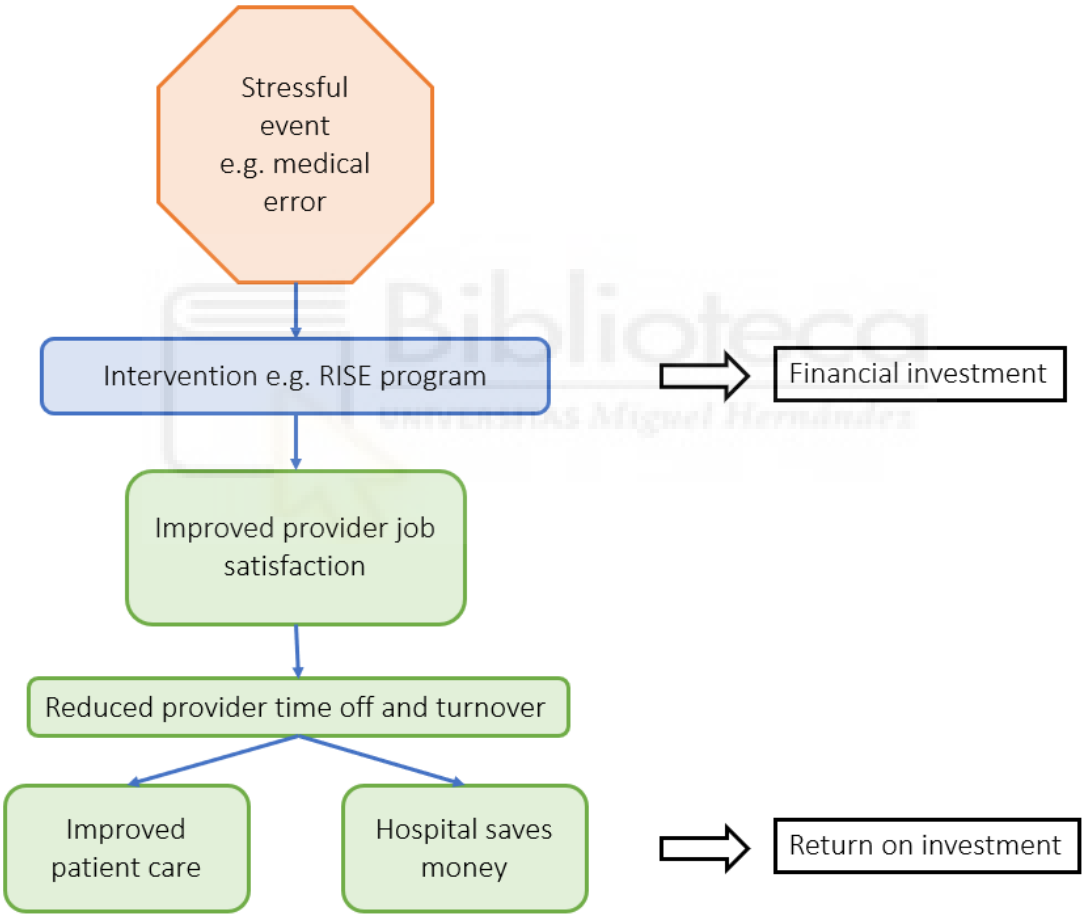
Intervention programs show potential in mitigating the detrimental effects of the SVP (76). Addressing the SVP through effective support systems can significantly lower emotional distress and the burden on HCWs (14, 23, 58). A systematic review by Busch et al. (2021) examined the effectiveness of SV support programs and found that they have a positive impact on both individuals and workplace environments, despite limited empirical data on their overall effectiveness (10, 72). Surveys conducted on programs like YouMatter and RISE indicate that a majority of HCWs find these initiatives beneficial. For instance, 85% of respondents acknowledged the positive impact of the YouMatter program on their department, while most RISE users reported satisfaction and confidence in the support they received (58, 77). Additionally, a large proportion of participants expressed willingness to recommend these programs to colleagues, with long-term improvements in perceived support availability (78). Qualitative insights and evaluations also support the usefulness of SV initiatives and online resources, which have contributed to greater awareness of patient safety issues (53, 59, 62, 78).

Beyond individual benefits, these programs have been linked to improvements in workplace culture, with 81% of staff in one study reporting a more supportive and safety-focused environment following program implementation (79). Furthermore, significant enhancements in patient safety culture were observed after introducing SV support programs in hospital settings (80). These findings suggest that well-structured support systems can help HCWs manage stress while fostering a culture of safety and mutual support. When integrated into a Just Culture framework, peer support initiatives further enhance a supportive and efficient work environment. Evaluations using validated instruments like SVEST (63) highlight a strong link between SV distress and increased absenteeism and turnover intentions among HCWs. For instance, a study validating the Italian version of SVEST found that higher distress levels correlated with a greater likelihood of leaving the profession (81).

Implementing support programs for HCWs not only enhances emotional well-being but could also reduce the financial impact of adverse events. An economic evaluation of the RISE program indicates that participation in peer support initiatives can generate substantial cost savings (82). These savings primarily result from reduced absenteeism and turnover rates which are major contributors to financial losses in the healthcare sector (82). For example, high turnover rates

incur substantial costs related to recruitment, training, and lost productivity, straining healthcare resources (83). A study by Moran et al. (2020) estimated that the RISE program alone could save hospitals up to $1.81 million by preventing financial losses associated with HCWs' inability to work (82). The study found that for each nurse who utilized the RISE program, the net monetary benefit was approximately $22,576.05, factoring in reduced turnover rates and fewer lost workdays (82). An expected benefit is illustrated in **Figure 3**.

Figure 3 *Expected benefits of RISE program (own illustration after Moran et al. (82))*



PSPs have demonstrated their potential to mitigate these financial challenges by fostering resilience and by helping HCWs effectively process distressing events. By addressing the psychological impact of adverse events, these initiatives reduce the likelihood of long-term absences and turnover, ultimately improving staff retention and workplace stability. By ensuring that HCWs receive the necessary support, these programs help maintain patient safety and operational efficiency, ultimately reducing overall financial strain on healthcare organizations.

2.5 Barriers to Implementing Peer Support Programs for Second Victims

Despite the recognized need for PSPs in healthcare, their implementation faces several barriers that hinder widespread adoption. Surveys of physicians reveal significant barriers to receiving support, with many HCWs reporting insufficient assistance in coping with the emotional consequences of patient safety incidents, highlighting a critical gap in structured support within healthcare systems (23, 84, 85). Although the prevalence of SV-experiences is well-documented, healthcare institutions often lack standardized approaches to support affected staff, leaving the issue inadequately addressed. This underscores the need for greater awareness and actionable solutions among HCWs, administrators, and the wider academic and professional communities. Surveys conducted across Europe (86, 87) and the United States (13, 14, 23, 64) emphasize the urgent demand for well-structured and standardized support frameworks to effectively address this challenge.

According to a systematic review of SV Support Resources by Busch et al. (2021) (10), key challenges encountered during the implementation of SV support programs include limited awareness of the phenomenon and the availability of support resources, a persistent culture of blame, and reluctance among healthcare providers to seek help (58, 77, 78, 88). Concerns regarding confidentiality and potential legal risks posed barriers to both affected staff and peer supporters (58, 65). Additionally, the significant time commitment required for peer supporters (65, 78), along with limited financial resources and the absence of financial incentives for healthcare institutions, further hindered program implementation and sustainability (58, 65, 77).

A major financial barrier is the lack of dedicated funding for long-term sustainability (65). Many programs heavily depend on volunteer efforts, which, although valuable, are not sustainable in the long term (65). Without secured financial support, participation in these programs often declines due to competing professional responsibilities and burnout among peer supporters (65). Additionally, healthcare institutions often struggle to allocate resources for SV support programs, as leadership may not perceive them as yielding a direct financial return (77). Unlike initiatives that focus on immediate patient care improvements, programs aimed at staff well-being are frequently overlooked in budget planning and resource allocation (65). The

competition for limited institutional resources means that emotional support initiatives are deprioritized in favor of efforts directly linked to patient outcomes (65).

Another challenge lies in the underutilization of existing resources such as employee assistance programs (58). Many HCWs are hesitant to use these services due to stigma or a lack of awareness, raising concerns about whether investments in such programs provide sufficient value (58). Furthermore, training peer supporters and promoting awareness of available resources require significant investment (77). Effective implementation of PSPs necessitates funding for training initiatives, marketing materials, and awareness campaigns to ensure widespread program utilization. However, many healthcare institutions lack the financial resources to support these essential activities (77).

In contrast to other high-stress professions, such as firefighting, law enforcement, and emergency response services, where psychosocial peer support systems are well-established and widely implemented (89, 90), the healthcare sector in Germany remains underdeveloped in this regard. Existing PSPs are typically confined to specific professional groups, individual hospitals, or pilot initiatives within certain regions (91–93). Although hospital-level evaluations have demonstrated the positive impacts of these programs, their success remains largely dependent on voluntary participation which limits their sustainability and broader implementation (94, 95).

A frequent barrier to adopting support programs is the perceived high cost of implementation for staff (58, 65, 77). However, this argument has yet to be substantiated by empirical evidence, and it is possible that concerns regarding financial feasibility are based on misconceptions. The assumption that PSPs require substantial financial investments should be critically examined, as their potential long-term benefits – such as reducing absenteeism, improving staff retention, and enhancing the overall workplace culture – may outweigh the initial costs. Addressing these financial concerns and shifting the narrative toward the cost-effectiveness of PSPs could facilitate broader acceptance and integration within healthcare institutions.

3. Research Gaps and Rationale

Healthcare systems worldwide, including Germany's, face critical workforce challenges, such as high rates of burnout, absenteeism, and turnover among medical and nursing staff. These issues are exacerbated by exposure to HIEs and SVP and increase the likelihood of short-term sick leave and long-term professional exits both of which impose significant costs on the healthcare system. Addressing these challenges is essential not only for maintaining workforce stability but also for safeguarding the quality and continuity of patient care while mitigating financial burdens on healthcare resources.

The following specific research gaps and objectives will be addressed in this doctoral thesis:

Research Gaps:

- **Economic Quantification of SVP in Germany**

Despite the growing recognition of the SVP as a critical challenge in healthcare, its economic impact remains largely unexplored, particularly within the German healthcare system. While studies have established the prevalence and psychological consequences of SVP among HCWs, there is limited evidence quantifying its financial impact within the German healthcare context. The absence of comprehensive data on the costs related to SVP-induced absenteeism, productivity loss, and staff turnover creates a challenge in developing effective interventions and policies.

- **Cost-Effectiveness of PSPs in the German Context**

Although PSPs have been implemented internationally, their economic feasibility in Germany remains underexplored. Most existing studies have focused on the psychological benefits of PSPs, with little emphasis on their cost-effectiveness in reducing absenteeism and turnover costs. This lack of localized evidence might prevent healthcare institutions in Germany from making informed decisions about the adoption and expansion of PSPs. Without data-driven insights, German hospitals face challenges in justifying investments in PSPs, resulting in reluctance to implement them on a broader scale.

Rationale for doctoral thesis

In conclusion, this doctoral thesis is motivated by the pressing need to address critical knowledge gaps in the economic impact of the SVP and the role of PSPs in German healthcare. SVP imposes significant psychological and professional challenges on HCWs, yet its economic consequences have not been comprehensively quantified in the German context. Furthermore, while PSPs have been implemented internationally, evidence for their cost-effectiveness and broader organizational benefits in Germany is limited. These gaps in knowledge leave healthcare administrators and policymakers without the necessary data to fully understand the financial implications of absenteeism and turnover caused by SVP, which is essential for developing targeted and efficient solutions. The objectives of this doctoral thesis, therefore, aim to address these gaps by evaluating the financial burden of SVP, demonstrating the economic benefits of PSPs, and exploring their role in enhancing psychological safety and workforce resilience. This work not only provides the empirical foundation for integrating PSPs into healthcare systems but also equips stakeholders with actionable insights to improve the well-being of HCWs and the quality of patient care.

Part B: Empirical Evidence

1. Research Objectives and Research Questions

In the two research studies that form the basis of this cumulative doctoral thesis, two distinct research questions were explored:

Objective I: To evaluate the cost-effectiveness of implementing a PSP in a German hospital setting by assessing its impact on staff absenteeism, turnover rates, and associated financial costs using a health economic modelling approach.

- **Research Question I:** *How does the implementation of a PSP impact absenteeism, turnover rates, and financial costs in a German hospital setting?*

Objective II: To analyze the nationwide economic implications of the SVP among HCWs in Germany and estimate the potential cost savings from implementing a structured, institutionalized PSP across the German healthcare system.

- **Research Question II:** *What are the nationwide economic implications of the SVP in Germany, and how can the implementation of a PSP contribute to reducing these costs?*

Building on these inquiries, a unified main research question has emerged, which was now examined within the scope of this doctoral thesis:

Main Objective of doctoral thesis: To assess the financial implications of PSPs in mitigating the effects of the SVP on HCWs, with a focus on reducing absenteeism, and improving staff retention.

- **Research Question of doctoral thesis:** *What are the financial implications of implementing PSPs in addressing the SVP among HCWs in Germany?*

2. Methods

This doctoral thesis is divided into two complementary studies aimed at addressing the economic implications of SVP and the potential role of PSPs in mitigating its effects within the German healthcare system. The first study seeks to assess the economic impact of HIEs over a one-year horizon. It employs a cost-effectiveness modelling approach to evaluate the financial viability of PSPs under a range of assumptions, while also examining the sensitivity of outcomes to variations in key parameters. The second study focuses on estimating the direct costs associated with absenteeism and turnover due to the SVP. It further provides an initial quantification of the potential cost savings achievable through the implementation of PSPs in German hospitals. Together, these studies aim to provide robust, data-driven insights to support decision-making and promote the adoption of effective support strategies for HCWs.

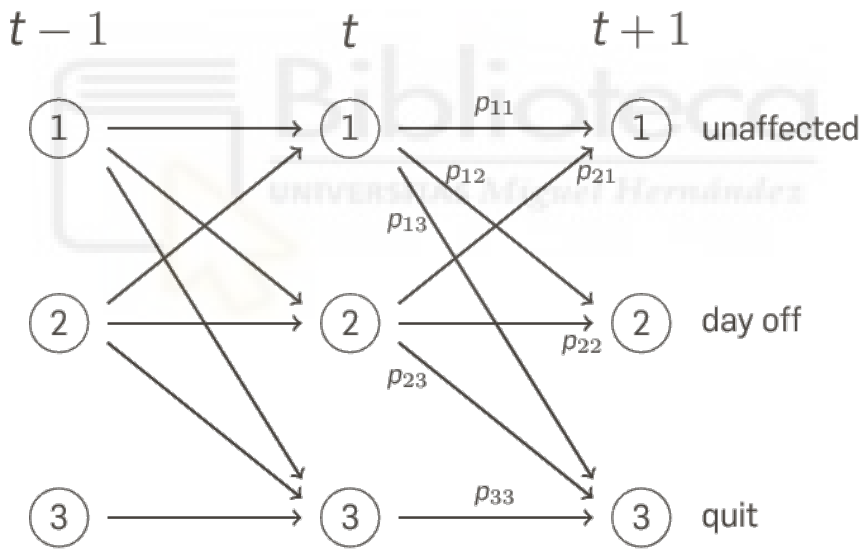
2.1 Material and Methods Study I

Study Focus: Study I, which is called *"Economic Value of Peer Support Program in German Hospitals"*, aimed to evaluate the economic advantages of implementing a PSP specifically designed to assist nursing staff in acute care settings in Germany.

Study Design: This evaluation used a health economic modelling approach to estimate the cost benefits of a support program, considering macroeconomic factors. Focused on the acute care nursing sector in Germany, the model was based on a facility scenario with approximately 1,000 nurses, typical of a hospital with around 550-600 beds. Parameters were sourced from survey results of previous studies, with expert input used where data was unavailable or insufficiently reliable. A Markov chain model operating on daily cycles was designed to compute expected values over a one-year time horizon, equating to 365 daily cycles. The stochastic model framework enabled sensitivity testing of key parameters. All costs were reported in Euros, and the model's timeframe focused on one year, specifically on nursing staff, to align with comparable studies. Only direct costs – such as sick leave and replacement expenses – were included, excluding indirect costs like productivity loss or quality reduction of the work of impacted employees.

Model Structure: The Markov chain model (**Figure 4**), adapted from the work of Moran et al. (82), describes individual states over time in discrete steps. At each step, the probability of transitioning from one state to another (e.g., from unaffected to taking a leave) is represented by transition probabilities (denoted as p_{ij} from state *i* to *j*). The model includes three states for a nurse: unaffected, day off, or quitting, with financial implications for the latter two. Daily probabilities of exposure to a HIE were factored independently of prior exposures. The model allowed individuals who resigned to permanently exit the cycle, while those on leave had a reduced likelihood of returning to an unaffected state. Unlike Moran et al., this model also factored in duration assumptions for leaves triggered by HIE, assuming affected individuals have a lower chance of rapid recovery.

Figure 4 *Markov Modell*



Key Assumptions: This model rested on several core assumptions:

- Probability of HIE exposure: A 2% daily chance of experiencing an HIE was assumed for each nurse, significantly influencing absenteeism and turnover rates (**Table 1**).
- Sick leave and turnover rates: Without a PSP, HIE increased the probability of taking a sick day to 5% and resignation likelihood to 0.68%. With the PSP, these rates were adjusted to 3% and 0.34%, respectively, based on international studies (**Table 1**).
- Cost of absenteeism and resignation: Each sick day was estimated at €500 in lost productivity, while replacing a nurse who quits was calculated at €75,000. The annual cost for each PSP participant was set at €550.

By combining these components, Study I aimed to estimate the PSPs economic potential in terms of reducing costly sick leaves and turnover within German hospitals.

Table 1 *Probabilities of employees upon a critical event*

State	Base Case
Probabilities High-impact event	0.0200
No PSP	
- Day off (high impact)	0.0500
- Day off (low impact)	0.0020
- Quit (high impact)	0.0068
- Quit (low impact)	0.0003
PSP	
- Day off (high impact)	0.0300
- Day off (low impact)	0.0020
- Quit (high impact)	0.0034
- Quit (low impact)	0.0001

Transition probabilities are obtained from combining the HIE incident rate with the probabilities of taking a day off or quitting (**Table 2**). The model then calculates staff turnover and absenteeism within 365 daily cycles to provide economic results. To assess sensitivities, we run the model for 100,000 trajectory pairs, each with PSP and non-PSP variants. Transition probabilities and expenditures vary per pair, following a normal distribution around base case values with a 10% standard deviation and a lower bound of zero.

Table 2 *Transition probabilities greater zero*

	No PSP	With PSP
P_{11}	0.9966	0.9973
P_{12}	0.0030	0.0026
P_{13}	0.0004	0.0002
P_{21}	0.1429	0.1429
P_{22}	0.8571	0.8571
P_{33}	1.0000	1.0000

2.2 Materials and Methods of Study II

Study Focus: Study II is called *"The Economic Implications of Psychosocial Peer Support for Health Workers in German Hospitals"* and aimed to estimate the economic losses related to events that lead to incapacitation or eventual professional exit, and evaluating the financial benefits of PSPs under the assumption that these initiatives decrease the occurrence of such events. The scope is limited to the inpatient healthcare sector in Germany.

Data Sources: The primary data sources for this analysis are the SeViD-I and SeViD-II studies, which supply prevalence rates for the SVP and estimates of symptom duration among HCWs in Germany (**Table 3**). Supplementary information includes insights gathered from healthcare management experts regarding recent costs associated with employee turnover, in addition to parameters established through literature review.

Table 3 *Proportion of affected individuals by recovery duration*

Time to Recovery	Proportion of Affected Individuals in %
Less than a day	4.5%
Within a week (but more than a day)	32.8%
Within a month (but more than a week)	34.5%
Within a year (but more than a month)	16.4%
More than a year	3.1%
Never	8.7%

Analytical Approach: The methodology in Study II unfolds in several stages:

1. The annual national incidence of SVP among doctors and nurses within German inpatient settings is estimated, alongside the burden of SVP as measured by self-reported symptom duration.
2. Economic losses associated with these severe incidents are calculated, accounting for costs from productivity loss due to SV trauma-related absenteeism, and replacement expenses for those departing their roles.

3. The potential cost savings from PSPs are assessed by estimating reductions in absenteeism and replacement needs under the assumption that these programs mitigate adverse outcomes.
4. A sensitivity analysis with shifts of 25% and 75% is performed to test how changes in critical assumptions affect the estimated economic impact, allowing for a comprehensive understanding of the potential benefits of PSPs.

Key assumptions underlying this model include:

- Incidence rates and impairment durations are derived from the SeViD studies. Population data for doctors and nurses are obtained from Germany's Federal Statistical Office.
- Expected reductions in adverse outcomes due to PSPs are drawn from international research, estimating a shift toward shorter symptom durations.
- The baseline absenteeism duration distribution is informed by the SeViD studies, modelled by the lower bound of grouped duration categories (e.g., up to one week, up to one year, etc.).
- Implementation effects of PSPs on absenteeism duration are modelled by shifting 50% of the duration distribution to the next shorter level.
- Costs per day of absenteeism are estimated at €411 for doctors and €137 for nurses, with replacement costs estimated at €150,000 for doctors and €50,000 for nurses, including recruitment, training, and temporary staffing costs.

In the final analysis of Study II, two scenarios are compared: a baseline without PSPs and an intervention scenario estimating economic damages with the program in place, assuming reductions in absenteeism and turnover.

3. Results

This doctoral thesis presents the economic impact of implementing PSPs in response to the SVP in the German healthcare system. Combining insights from two complementary studies, it provides a comprehensive analysis of the economic costs of SV, the financial benefits of PSPs, and their broader impact on workforce stability and psychological safety. The findings related to the three initially formulated research questions are briefly summarized, while a comprehensive presentation of the study results can be found in the studies I and II included in the appendix.

How does the implementation of a PSP impact absenteeism, turnover rates, and financial costs in a German hospital setting?

Study I conducted a detailed economic evaluation to assess the impact of the PSP on absenteeism, turnover rates, and financial costs within a German hospital employing 1,000 HCWs. Using a Markov model to simulate workforce dynamics over a one-year period, the results indicated substantial economic and operational benefits associated with PSP implementation. The findings revealed that the PSP led to a notable decrease in staff turnover, with dropout rates declining from 14.3% to 5.8%. This reduction in staff attrition contributed significantly to cost savings, given the high replacement costs associated with recruiting and training new personnel, which were estimated at €75,000 per staff member. Moreover, absenteeism rates were moderately reduced, with an estimated decline in the number of sick days from 6,766 to 6,141 annually.

The financial impact analysis indicated that the implementation of PSP resulted in an average cost saving of €6,672 per HCW, translating to an annual institutional saving of approximately €6.67 million. Further effects in the scenario institution with 1,000 HCWs upon implementing a PSP are shown in **Table 4**.

Table 4 *Effects upon implementing a PSP*

Information per year	Without PSP	With PSP
Sick days	6766	6141
Dropouts	143	58
Cost of sick days	3,383,230 €	3,070,470 €
Cost of dropouts	10,694,785 €	4,335,666 €
Total costs	14,078,015 €	7,406,136 €
Cost per Person	14,078 €	7,406 €

Sensitivity analysis further confirmed the robustness of these findings, demonstrating that even with variations in input parameters, the economic advantage of PSP remained significant. These results of Study I affirm the cost-effectiveness of PSPs and their potential to enhance organizational resilience by improving staff well-being and reducing operational disruptions caused by absenteeism and turnover.

What are the nationwide economic implications of the SVP in Germany, and how can the implementation of a PSP contribute to reducing these costs?

The analysis of the nationwide economic implications of the SVP in Germany in Study II highlighted the substantial financial burden posed by absenteeism and staff turnover among HCWs. Data from the SeViD studies estimated an SVP prevalence of nearly 60% among physicians and nurses, resulting in annual costs of approximately €1.56 billion for physicians and €1.87 billion for nurses due to absenteeism and staff replacement expenses. The financial impact of absenteeism was quantified using expert estimates, indicating an average daily loss of €411 per physician and €137 per nurse.

The implementation of a structured, nationwide PSP was projected to significantly alleviate these costs by reducing the duration and frequency of absenteeism, as well as mitigating staff turnover. The introduction of PSPs was estimated to decrease absenteeism costs to €0.85 billion for physicians and €1.02 billion for nurses, yielding potential annual savings of €1.55 billion for the healthcare sector. This cost reduction was primarily attributed to improved emotional resilience, quicker recovery times, and reduced intentions to leave the profession following adverse events.

Furthermore, the analysis suggested that beyond direct financial savings, PSPs could foster a healthier and more supportive work environment, leading to improved patient care quality and

reduced liability risks for healthcare institutions. These findings provide compelling economic evidence in favour of scaling up PSPs at the national level to enhance workforce sustainability and financial efficiency within the German healthcare system.

What are the financial implications of implementing PSPs in addressing the SVP among HCWs in Germany?

The combined findings from both studies underscore the multifaceted financial and organizational benefits of implementing PSPs in addressing the SVP among HCWs in Germany. At the hospital level, PSPs were shown to reduce financial costs associated with absenteeism and staff turnover, yielding annual savings of €6.67 million for a hospital with 1,000 employees. On a national scale, PSP implementation could result in cost savings exceeding €1.55 billion annually by mitigating SVP-induced absenteeism and turnover.

4. Discussion

Despite the recognized impact of SVP on individuals and healthcare organizations, its economic implications have remained largely unexplored in the German context. Furthermore, while PSPs have demonstrated their effectiveness in alleviating psychological distress and improving retention rates in other healthcare systems, their cost-effectiveness within Germany has not yet been thoroughly examined. This doctoral thesis aims to address a significant gap in the existing literature by *assessing the financial implications of PSPs in mitigating the effects of the SVP on HCWs*. By considering the limitations and gaps identified in the literature, alongside the findings obtained from the studies conducted in this doctoral thesis, a comprehensive discussion of the results is provided below.

4.1 Closing the Research Gaps with Study Results

This doctoral thesis provides a complementary perspective on the economic effects of SVP and PSPs in German hospitals by examining the issue from different angles. Study I focuses on an individual hospital level, employing a Markov model to illustrate how PSPs help reduce absenteeism and staff turnover, leading to significant financial benefits and greater job stability. In contrast, Study II broadens the scope to a nationwide analysis, revealing how implementing PSPs across the healthcare sector could lead to massive cost reductions. While the first study presents a detailed look at the economic impact within a single institution, the second provides a broader policy-oriented argument, demonstrating how these programs could save billions of Euros annually if implemented on a larger scale in Germany. By utilizing different methodologies – one based on predictive modelling and the other drawing from empirical data – these studies together build a compelling case for the widespread adoption of PSPs. Together, they contribute to the growing body of evidence demonstrating that PSPs are not only essential for supporting HCWs but also represent a cost-effective strategy for healthcare institutions and policymakers.

A key contribution of this research is the first comprehensive quantification of the economic impact of SVP in German healthcare. By employing economic models, these studies outline the

substantial economic burden of the SVP on healthcare systems, highlighting its financial burden on individual institutions and the broader healthcare system.

At the hospital level, Study I quantifies the costs of absenteeism and turnover using a Markov model, estimating that a hospital with 1,000 employees incurs losses exceeding €14 million annually due to SVP. Of this total, approximately €3 million is attributed to sick leave costs, while staff turnover accounts for around €11 million, highlighting the significant financial strain caused by HCWs distress. At the national level, Study II expands this analysis, estimating that the economic costs associated with SVP-related absenteeism and turnover in Germany amount to approximately €3.43 billion annually, comprising €1.56 billion for physicians and €1.87 billion for nurses. These figures emphasize the systemic economic impact of SVP and the urgent need for effective interventions to reduce these losses. The research further indicates that the indirect costs of SVP, like presenteeism and reduced quality of patient care, may worsen these financial losses, although they were not incorporated into the current analysis and remain unquantified.

Given the substantial financial burden of SVP, implementing PSPs as a formalized intervention strategy in Germany offers a promising cost-effective solution to mitigate the adverse effects of SVP on HCWs. Despite concerns about the potential costs of implementing PSPs (58, 65, 77), this research is the first in Germany to demonstrate their economic viability in reducing expenses associated with the SVP. Economic evaluations conducted in the two studies demonstrate that the implementation of a PSP – an approach favoured by many HCWs – could result in significant cost savings for hospitals by reducing absenteeism and turnover costs, offering a clear financial incentive for their implementation: Study I provides a hospital-level economic evaluation, employing a Markov model to estimate the direct financial impact of PSPs on absenteeism and turnover. The study demonstrated tangible cost savings of approximately €6.67 million annually for a hospital with 1,000 employees, equating to savings of €6,672 per participating HCW and showcasing PSPs as a financially viable intervention. The expected budgetary impact within the institution suggests economic potential even for medium-sized companies with 1,000 employees. These findings are consistent with the cost analysis at Johns Hopkins Hospital, which estimated potential savings of $1.81 million from the RISE program based on a smaller sample of 80 nurses (82). A key driver of cost savings is the reduction in job resignation rates, a major source of financial strain in hospitals according to the literature (45–49). Our assumed reduction from 0.68% to 0.34% is significantly smaller than the estimate by Moran et al., who projected a decline from 1.22% to 0.34% (82). Thus, we regard our results as conservative. The Markov

model estimated that 14.3% of nursing staff leave their jobs annually, aligning with figures from the 2021 German Hospital Report (96), which indicates a turnover rate of one in six nurses (97). Introducing a PSP in the Markov model reduced resignations by 5.8% while increasing both the number and cost of sick days. This rise in sick days is partly due to higher staff retention, leading to a greater proportion of employees remaining in the system rather than exiting altogether. Additionally, the average number of sick days was reduced from 6.77 to 6.14 days per year, further contributing to financial benefits for healthcare organizations. Study II expanded the economic evaluation to a national scale, estimating that the implementation of PSPs across Germany could lead to cost reductions of over €1.55 billion annually by addressing absenteeism and staff turnover and reducing SVP-related costs. Specifically, the projected cost reductions include lowering physician-related expenses from €1.56 billion to €857.3 million and nurse-related costs from €1.87 billion to €1.02 billion. These findings indicate that PSPs have the potential to cut SVP-related costs by approximately 50%, demonstrating their economic efficiency at scale.

This thesis adopts a conservative approach in estimating the financial implications of the SVP and the cost-effectiveness of PSPs, ensuring that the findings do not overstate the economic benefits. Both studies take a careful and measured approach, emphasizing direct financial costs while deliberately leaving out broader, indirect economic effects of the SVP and the use of PSPs. By prioritizing measurable economic factors, such as absenteeism and staff turnover, the analyses do not account for additional financial burdens, including presenteeism, reduced work performance, increased medical errors, and the long-term effects of impaired decision-making on patient safety. This omission is significant, the OECD's research *"The Economics of Patient Safety"* estimates that unsafe work contributes to 13% of total healthcare expenditure (98). Beyond absenteeism and turnover, an equally significant yet less visible cost of SVP is presenteeism, in which distressed HCWs remain at work but perform suboptimal. Research indicates that for every day lost to absenteeism, 1.5 days are lost to presenteeism, with its financial toll estimated to be twice that of absenteeism, amounting to £21.2 billion per year in the UK alone (99). Another study further highlights its impact, estimating that the equivalent of 35 working days per person per year is lost due to presenteeism (100).

The findings are consistent with previous research indicating that hospitals with PSPs positively impact employee retention (84, 101), while those with poor nurse retention face higher costs (102). Similarly, enhancing employee well-being not only helps reduce healthcare expenses by

lowering the cost of work-related harm, estimated at up to 2% of total healthcare expenditure, but also plays a significant role in minimizing patient harm by up to 12% (2), further reinforcing the financial case for PSPs.

The models used in both studies also apply cautious assumptions about how much PSPs can mitigate turnover and absenteeism, ensuring the cost savings presented remain conservative estimates rather than optimistic projections. Given that workplace inefficiencies and unsafe practices contribute significantly to healthcare expenditures, the actual economic impact of SVP and the potential benefits of PSPs are likely greater than the studies suggest. By applying this restrained methodology, both studies provide grounded and reliable findings, ensuring their conclusions remain realistic rather than overstated.

4.2 Practical Implications of Peer Support Programs for Addressing the Second Victim Phenomenon in German Healthcare

The findings from these studies reinforce the urgent need for a nationwide, institutionalized approach to implement PSPs and highlight the importance of increasing awareness of the impact of the SVP.

The introduction of PSPs in hospitals has shown to enhance employee well-being and improve organizational outcomes (103). Employee support initiatives and psychological well-being play a crucial role in job satisfaction, directly influencing staff retention. PSPs can help reduce turnover, strengthen HCWs resilience, and improve the quality of care (77, 104, 105). PSPs may also increase the likelihood of employees arriving at work in better conditions, fostering a positive environment that supports high-quality, safe care. Additionally, they can boost staff engagement and reinforce commitment to the organization.

To effectively address the SVP, interventions should be integrated at the individual, team, and organizational level in German hospitals. Personalized support options, such as peer mentoring and psychological first aid, offer immediate assistance to those affected. At the team level, fostering a culture of mutual support and psychological safety strengthens collaboration and resilience. On a larger scale, integrating structured PSPs into hospital protocols and national

healthcare policies ensures their long-term viability. By simultaneously considering occupational, psychological, and social dimensions, these programs can serve as a foundation in promoting staff well-being and maintaining high standards of patient care (54, 57, 106).

The findings of this doctoral thesis address the gap in understanding the cost-effectiveness of PSPs in Germany, enabling healthcare institutions to justify investment in such programs not only for their psychological benefits but also their economic impact. From a macroeconomic perspective, the up-scaling of PSP initiatives beyond the current voluntary based approaches is essential. The studies highlight that SVP-related absenteeism and turnover impose a significant financial burden on the healthcare system. The nationwide implementation of PSPs could reduce these costs, leading to annual savings exceeding €1.55 billion. These findings demonstrate that PSPs are a cost-effective strategy, alleviating financial pressure while fostering a more resilient healthcare workforce. The studies' findings indicate that these programs contribute to significant cost reductions per participating healthcare worker, leading to substantial overall savings for hospitals of a comparable size. This evidence supports the strategic allocation of resources toward peer support initiatives, highlighting their long-term value in maintaining workforce stability, minimizing expenses related to staff turnover and training, and enhancing the overall efficiency of healthcare delivery. These estimates provided concrete evidence to support the investment in proactive support mechanisms for HCWs affected by SVP, addressing a critical gap in financial planning for healthcare institutions.

4.3 Methodological Limitations

While the findings of both studies highlight promising economic benefits, it is crucial to acknowledge the studies' limitations. Both studies acknowledge significant methodological limitations that impact the accuracy and generalizability of their findings regarding the economic implications of PSPs for HCWs. A key shared limitation is the reliance on simplified economic models that incorporate available data, existing literature, expert opinions, and assumptions, which introduce inherent uncertainties and necessitate cautious interpretation. Both studies adopt conservative approaches that may lead to an underestimation of the full economic benefits of PSPs. Additionally, both studies primarily focus on physicians and nurses, omitting other professional groups that could also benefit from PSPs. Moreover, the studies rely heavily

on self-reported data, which may be influenced by biases such as social desirability, self-perception, and variations in resilience and coping mechanisms among HCWs. Specific to Study I, one major limitation is the challenge of isolating the precise impact of adverse events on workforce retention, as multiple factors, including organizational culture, workload, and personal circumstances, influence professionals' decisions to leave their roles. Furthermore, the study does not consider the potential effects of PSPs on the broader healthcare working environment. Reliable quantification of adverse event impacts would require large-scale and resource-intensive studies, which remain difficult to conduct. Additionally, indirect costs such as presenteeism, which may result in decreased performance, increased medical errors, and higher long-term financial burdens, are not incorporated into the financial assessment, and the study provides only a simplified perspective due to the scarcity of comprehensive data. Study II, in contrast, faces methodological concerns regarding the assumption that recovery time can serve as a direct surrogate for absenteeism, potentially misrepresenting the economic impact by not fully accounting for presenteeism. The calculation of economic impact based on self-reported one-year prevalence is another limitation, as it may not align with lifetime prevalence due to variations in reporting bias and resistance or resilience among individuals. Additionally, as the study relies on self-reported surveys rather than standardized, objective criteria for identifying and quantifying severe incidents, it may lead to an underestimation of the true prevalence and severity of SV experiences. Overall, these limitations highlight the need for future research incorporating standardized data collection methods, broader professional representation, and comprehensive assessments of both direct and indirect economic consequences of PSPs in healthcare settings.

4.4 Future Needs in Research

Both studies highlight important gaps in knowledge and methodological limitations that necessitate further research to comprehensively understand the economic and professional impact of PSPs in healthcare. Future research should address the following areas:

Future research on PSPs in German healthcare should build upon the valuable insights gained from economic simulations by incorporating real-world studies within hospital settings. While current models effectively highlight the potential cost savings and workforce benefits of PSPs,

further research is needed to validate these findings in practice. Longitudinal studies tracking direct and indirect financial impacts, workforce retention, and hospital budgeting over multiple years will provide a more comprehensive understanding of the long-term effects of SVP and PSPs. Research should also consider the hidden costs of presenteeism, which could further strengthen the economic argument for PSPs. Combining simulation-based projections with empirical hospital data will ensure more precise and actionable recommendations for healthcare institutions and policymakers.

Additionally, research should extend beyond physicians and nurses to include paramedics, radiologists, therapists, and administrative staff. Evaluating PSP implementation across various healthcare environments, such as hospitals, emergency care units, and outpatient clinics, can offer a broader perspective on its adaptability. Comparative studies with other high-stress professions, including emergency services and law enforcement, may reveal valuable insights into optimizing peer support structures.

Determining the most effective PSP design remains a critical area for further research. While studies have explored different models of support initiatives, more research could refine these approaches to identify the most effective and scalable solutions. Additional investigation into best practices for training peer supporters and integrating PSPs across healthcare institutions of varying sizes would help ensure their long-term success. Further economic evaluations and real-world case studies could provide deeper insights into cost-effective structures that maximize employee well-being and retention, making widespread adoption more feasible.

Beyond the structural aspects of PSPs, their success is closely tied to the organizational culture within healthcare settings. Previous studies have highlighted challenges such as stigma and scepticism toward peer support, but more research could examine how these barriers manifest in different healthcare environments and the most effective ways to overcome them. Investigating leadership engagement, methods to embed PSPs into hospital policies, and approaches to fostering trust among staff would be valuable in ensuring the lasting acceptance of these programs. Expanding research in this area would contribute to a more comprehensive understanding of how to cultivate a workplace culture where peer support is not just available but actively embraced as an essential element of HCWs' well-being.

Beyond national efforts, further research should explore the potential for European cooperation in peer support initiatives. The SVP is a widespread issue affecting HCWs across Europe, yet

support structures remain fragmented. Collaborative studies between European countries could help establish a standardized framework for PSPs, ensuring best practices are shared and implemented across borders. Investigating how different healthcare systems address SVP, as well as assessing the feasibility of cross-border support networks, could enhance the effectiveness and accessibility of PSPs. A Europe-wide strategy would not only strengthen health worker resilience but also improve patient safety by fostering a more supportive and unified healthcare workforce.

4.5 Justification for Submitting the Studies to their Respective Journals

The choice to submit these studies to the International Journal of Public Health (IJPH) and the Journal of Healthcare Leadership (JHL) was deliberate and well-matched to the nature of each study's findings.

Study I aligns naturally with IJPH's focus on public health challenges and evidence-based solutions. By presenting concrete data on how SVP affects both HCWs and institutions financially, this study contributes to ongoing discussions on workforce well-being and health system efficiency. The journal's broad international readership allows the findings to inform not only the German healthcare system but also global efforts to strengthen healthcare resilience.

Study II was best suited for JHL due to its emphasis on leadership and healthcare management. Healthcare administrators require actionable strategies backed by data, and this research provides a clear economic case for implementing PSPs as a tool for workforce stability. JHL focuses on practical leadership solutions, making it the ideal outlet for findings that underscore the impact of structured peer support on hospital operations and long-term sustainability.

Each study offers valuable insights tailored to the priorities of its respective journal. The first informs policy-level decisions on public health resource allocation, while the second provides healthcare leaders with concrete management strategies. Submitting them to IJPH and JHL ensures they reach the right audiences – public health experts, policymakers, and hospital administrators – who can translate these findings into real-world improvements in healthcare systems.

5. Conclusion

This doctoral thesis has addressed two significant research gaps within the German healthcare sector: the economic quantification of the SVP and the cost-effectiveness of PSPs. The findings clearly indicate that the SVP imposes a substantial financial burden on the healthcare system, with absenteeism and turnover costs reaching billions of Euros annually. These economic consequences highlight the urgent need for proactive interventions aimed at supporting HCWs who experience psychological distress following adverse events.

The economic analyses of PSPs conducted in this doctoral thesis provide compelling evidence that implementing structured peer support initiatives can yield significant financial benefits. With annual savings of approximately €6.67 million for a hospital with 1,000 employees, PSPs emerge as a cost-effective strategy to mitigate the negative effects of the SVP. On a national level, implementing a comprehensive PSP could significantly reduce expenses by lowering absenteeism and staff turnover, with potential savings of €1.55 billion per year.

Beyond financial savings, PSPs contribute to a more resilient healthcare workforce by fostering a supportive culture that enhances staff well-being, patient safety, and institutional reputation. However, achieving widespread adoption of these programs requires a concerted effort from healthcare leaders and policymakers to overcome existing barriers and create an environment where support is readily available and accessible to all professionals. These findings fill the existing knowledge gap, equipping healthcare administrators and policymakers with the data needed to prioritize SVP as an economic and operational issue in healthcare management.

Looking forward, the integration of PSPs into national healthcare policies and accreditation standards could serve as a transformative step in addressing the SVP at a systemic level. Future research should continue to explore the long-term implications of these programs, ensuring that they evolve in response to the changing needs of HCWs and contribute to the overall sustainability of the healthcare system.

In conclusion, addressing the SVP through structured peer support is not only an ethical imperative but also an economically sound investment. By prioritizing the well-being of HCWs, hospitals can achieve a balance between financial sustainability and high-quality patient care, ultimately leading to a more resilient and effective healthcare system.

6. Conclusión

Esta tesis doctoral ha abordado dos importantes lagunas de la investigación en el sector sanitario en Alemania. Primero, la cuantificación económica de la SVP. Segundo, la eficiencia de las PSP. Los resultados indican claramente que la SVP supone una carga financiera sustancial para el sistema sanitario en Alemania, con costes debidos al absentismo y la rotación que alcanzan una cifra que cabe expresar en miles de millones de euros anuales. Estos enormes costes, ponen de relieve la urgente necesidad de intervenciones proactivas dirigidas a apoyar a los PSV que experimentan angustia psicológica tras verse involucrados en eventos adversos con consecuencias graves para los pacientes.

Los análisis económicos de las PSP, realizados en esta tesis doctoral, aportan pruebas convincentes de que la puesta en marcha de iniciativas estructuradas de apoyo entre iguales puede reportar importantes beneficios económicos. Con un ahorro anual de, aproximadamente, 6,67 millones de euros para un hospital con unos 1.000 empleados, las PSP surgen como una estrategia coste-efectiva para mitigar los efectos negativos del SVP. A escala nacional, la implantación de un PSP integral podría reducir significativamente los costes de funcionamiento, al disminuir el absentismo y la rotación de personal, con un ahorro potencial de 1.550 millones de euros al año.

Más allá del ahorro económico, los PSP contribuyen a que la plantilla sanitaria sea más resiliente al fomentar una cultura de apoyo que mejora el bienestar del personal, la seguridad de los pacientes y la reputación institucional. Sin embargo, lograr la adopción generalizada de estos programas requiere un esfuerzo concertado por parte de los líderes sanitarios y los responsables políticos para superar las barreras existentes y crear un entorno, en el que el apoyo sea accesible para todos los profesionales. Estos hallazgos llenan el vacío de conocimiento existente, dotando a los administradores sanitarios y a los responsables políticos con los datos necesarios para priorizar la PSP como una opción viable, tanto desde el punto de vista económico, como operativo.

De cara al futuro, la integración de las PSP en las políticas sanitarias nacionales, y en las normas de acreditación de instituciones, podría suponer un paso decisivo para abordar la VPC a nivel sistémico. La investigación en el futuro debería seguir explorando las implicaciones a largo plazo

de estos programas, garantizando que evolucionan en respuesta a las necesidades cambiantes de los PS y contribuyen a la sostenibilidad del sistema sanitario.

En conclusión, abordar la SVP mediante el apoyo estructurado entre iguales no es sólo un imperativo ético, sino también una inversión económicamente sólida. Al dar prioridad al bienestar de los PS, los hospitales pueden lograr un equilibrio entre la sostenibilidad financiera y la atención al paciente de alta calidad, lo que en última instancia, conduce a un sistema sanitario más resistente y eficaz.

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Part C: Appendix

Throughout the achievement of the objectives of this doctoral thesis, two scientific articles have been developed.

- **Study I. “Economic Value of Peer Support Program in German Hospitals”**

  Roesner H, Neusius T, Strametz R, Mira JJ. Economic Value of Peer Support Program in German Hospitals. Int J Public Health. 2024 Jun 13;69:1607218. doi: 10.3389/ijph.2024.1607218. PMID: 38939515; PMCID: PMC11208334.

- **Study II. "The Economic Implications of Psychosocial Peer Support for Health Workers in German Hospitals"**

  Strametz R, Roesner H, Neusius T, Wiesenhuetter I, Bushuven S, Mira JJ, Hinzmann D, Heininger S. The Economic Implications of Psychosocial Peer Support for Health Workers in German Hospitals. J Healthc Leadersh. 2025 Jan 25;17:15-22. doi: 10.2147/JHL.S498789. PMID: 39882308; PMCID: PMC11776421.

Study I.

"Economic Value of Peer Support Program in German Hospitals"

Metrics

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Economic Value of Peer Support Program in German Hospitals

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Objectives: Acknowledging peer support as the cornerstone in mitigating the psychosocial burden arising from the second victim phenomenon, this study assesses the economic benefits of a Peer Support Program (PSP), compared to data of the Resilience In Stressful Events (RISE) program in the US, within the acute inpatient care sector in Germany.

Methods: Employing a Markov model, this economic evaluation analyzes the cost benefits, including sick day and dropout costs, over a 1-year period, comparing scenarios with and without the Peer Support Program from a hospital perspective. The costs were calculated as an example based on a hospital with 1,000 employees. The estimations are considered conservative.

Results: The anticipated outcomes demonstrate an average cost saving of €6,672 per healthcare worker participating in the Peer Support Program, leading to an annual budgetary impact of approximately €6,67 Mio. for the studied hospital.

Conclusion: The integration of a PSP proves economically advantageous for German hospitals, not only preserving financial resources but also reducing absenteeism, and mitigating turnover, thereby enhancing overall patient care.

Keywords: patient safety, peer support program, second victim, health worker safety, economic impact

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INTRODUCTION

The healthcare profession inevitably exposes practitioners to highly stressful events. Healthcare providers involved in unanticipated adverse patient events, unintentional healthcare errors, or patient injuries, and who become negatively impacted, are defined as "second victims" [1]. Prevalence studies among German nurses and physicians revealed a 59%–60% prevalence of second victims, with a 12-month prevalence of 49% for nurses and 35% for physicians [2, 3]. Emotional reactions, coping strategies, and overall wellbeing post-event vary widely among individuals [4–6]. The resulting spectrum of psychological responses includes guilt, anxiety, diminished self-confidence, loss of trust in the healthcare system, absenteeism, turnover intentions, alcoholism, and, in extreme cases, suicide [7–9].

The second victim phenomenon not only negatively affects individuals but also has the potential to detrimentally impact the quality of future patient care [10]. This impact may manifest through defensive medical practices or an elevated incidence of medical errors following post-traumatic stress disorder development [11–14]. The recovery process may lead second victims down paths of dropping out, surviving, or thriving [15], with outcomes affecting work positivity, time off, or even departure from the profession [15, 16]. These outcomes not only harm individuals but also result in

financial losses for employing institutions. Nurse turnover, a significant challenge for the healthcare sector, leads to intellectual capital and productivity losses [17–19]. Supportive interventions can alleviate the negative consequences of the second victim phenomenon [20]. However, a lack of institutional support is reported by the majority of healthcare providers [15, 21]. The need for structured support programs is evident from surveys in Europe [22, 23] and the US [13, 15, 24, 25].

While other countries have established support program examples, such as RISE [21], the forYOU program [26] and the Medically Induced Trauma Support Service (MITSS) program [27] in the US, the open access online Second Victim support program MISE (Mitigating the Impact on Second Victims) [28] in Spain, Kollegiale Hilfe (KoHi) in an Austrian hospital [29], and a support program in Switzerland [30], Germany has only initial voluntary commitment-based approaches.

The Joint Commission as an independent, non-profit organization that accredits US health programs and organizations [31], recommends healthcare institutions establish structured peer support programs (PSP), emphasizing proactive peer support [32]. Healthcare workers seem to mostly rely on persons they are close with, and to a much lesser extend seek professional help [33]. Peer support is identified as the most desired form of support by second victims [2, 7, 25, 34–36], with evaluations of program effectiveness in various studies [34, 35, 37].

In addition to positive medical and psychological effects, support programs for second victims in Germany are anticipated to be cost-effective. Moran et al.'s study on the Resilience in Stressful Events (RISE) program revealed potential savings of $1.81 million within a healthcare institution when applied to a staff of 80 nurses [38]. The RISE program, designed to help hospital staff cope with stressful patient-related events [21], demonstrated cost benefits by comparing program costs to reduced financial losses due to healthcare worker absenteeism. However, the economic impact of a PSP in Germany remains unexplored. To address this gap, we investigated the economic cost benefits of implementing a PSP in the acute inpatient care sector in Germany.

METHODS

Design

To assess the economic cost benefits of a support program with consideration of macroeconomic effects, we employed health economic model calculations. This evaluation focused on support programs within the acute care nursing sector in Germany, specifically targeting an institution with 1,000 nursing staff, equivalent to a hospital with approximately 550–600 beds. Model parameters were derived from survey data from previous studies and expert judgement, if empirical evidence was unavailable or unconvincing. A Markov chain model based on single day cycles was developed, allowing to determine expectation values on a time horizon of 1 year, i.e. 365 daily cycles. Stochastic modeling allowed us to assess the model's sensitivity to parameter variations. Costs were reported in Euros, and the time horizon for the analysis was 1 year, concentrating on nursing staff for comparability with other studies. Direct costs such as the time off and worker replacement costs in acute inpatient care sector in Germany are considered, whereas indirect costs like employer productivity losses or quality impairments in the work of affected staff members were not considered.

Model

Building upon Moran et al.'s study [38], we constructed a Markov chain model (**Figure 1**). Markov chains describe a time series of events in discrete steps. The probability to reach a given state at time *t* depends only on the state in the previous time step *t-1*. To reach state *j*, after being in state *i* in the previous step, is referred to as $p_{ij.}$ The model describes the state of an individual as being one of three possibilities, that are (a) unaffected, (b) 1 day leave, (c) quit, the latter two of which being identified with financial losses. The transition between these states from day to day were conditioned on the random event of a stressful incident (high impact event, HIE). Every individual had each day an identical risk of being exposed to a HIE independently of previous occurrences. The model operated on a daily cycle, spanning 365 cycles in total. If nurses chose to quit, they permanently exited the modeling cycle. In contrast to Moran et al., we include the duration of HIE induced leaves by assuming that individuals return to the unaffected state with a reduced probability. The Markov chain allows a deterministic description of the expectation value of losses.

Assumptions

Our calculations assume that each employee faces an unforeseen incident daily, i.e., HIE, with a probability of 2.00%. Upon an HIE, the probability of a sick leave increases to 5.00% (compared to 0.03% without trauma). Likewise, the probability of resignation rises to 0.68% (compared to 0.03% without trauma). The introduction of a PSP program reduces the probability of a sick leave to 3.00% and the probability of resignation to 0.34%. The assumptions are based on Moran et al. (2020), but adapted to the present situation (**Tables 1**, **2**). In particular, we assume a far lower incidence rate and a lower probability to quit, but a higher probability of sick leaves with an average length of 7 days (corresponding to a recovery rate of 14.29% per day).

According to expert judgement, the loss of a 1-day leave is assumed to be €500 and the replacement of a nurse that quits accounts to €75,000. The estimated cost associated with participating in the support program is €550 per healthcare worker within 1 year.

The model ignores HIE effects on productivity of impaired staff members.

Sensitivity Analysis

To assess sensitivities, we run the model for 100,000 pairs of individual trajectories, each pair consisting of a PSP and non PSP variant, varying transition probabilities and expenditures for each pair such that the parameters were normally distributed around

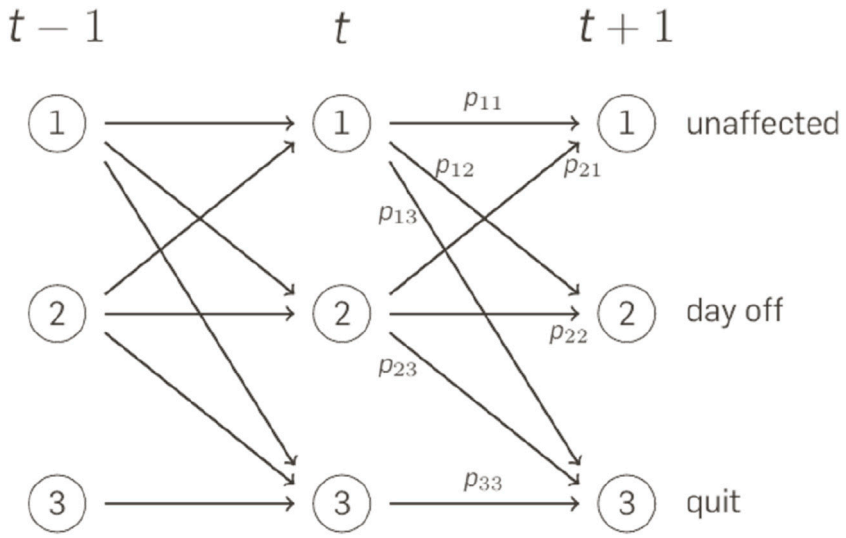

FIGURE 1 | Markov Chain Model: At every time step t, the individual is either [1] unaffected [2], takes a day off, or [3] quits the job. The pij define the transition probability from state i to state j in the subsequent time step. Economic Value of Peer Support Program in German Hospitals, Germany, 2024.

TABLE 1 | Probabilities of employees upon a critical event. Economic Value of Peer Support Program in German Hospitals, Germany, 2024.

State	Base case
Probabilities High-impact event	0.0200
No PSP	
- Day off (high impact)	0.0500
- Day off (low impact)	0.0020
- Quit (high impact)	0.0068
- Quit (low impact)	0.0003
PSP	
- Day off (high impact)	0.0300
- Day off (low impact)	0.0020
- Quit (high impact)	0.0034
- Quit (low impact)	0.0001

TABLE 2 | Transition probabilities greater zero, as obtained from combining the high impact event (HIE) incidence rate with the probabilities of taking a day off/ quitting. Economic Value of Peer Support Program in German Hospitals, Germany, 2024.

	No PSP	With PSP
P_{11}	0.9966	0.9973
P_{12}	0.0030	0.0026
P_{13}	0.0004	0.0002
P_{21}	0.1429	0.1429
P_{22}	0.8571	0.8571
P_{33}	1.0000	1.0000

TABLE 3 | Effects in an Institution with 1,000 employees upon implementing a Peer Support Program (PSP). Economic Value of Peer Support Program in German Hospitals, Germany, 2024.

Information per year	Without PSP	With PSP
Sick days	6766	6141
Dropouts	143	58
Cost of sick days	3,383,230 €	3,070,470 €
Cost of dropouts	10,694,785 €	4,335,666 €
Total costs	14,078,015 €	7,406,136 €
Cost per Person	14,078 €	7,406 €

the base case values of the model with a standard deviation of 10% of the distribution's expectation value and a lower bound of zero.

RESULTS

The simulation encompassed direct costs per sick day for healthcare workers and recruitment costs for new employees approximated by annual salaries. In the course of 1 year 14.3% of the nursing staff quit the job, whereas the introduction of PSP reduced this figure to 5.8%. Sick days are moderately reduced from an expected value of 6.77 days without PSP to 6.14 days with PSP.

The economic model calculation for a healthcare facility in Germany, mirroring the RISE program at Johns Hopkins University, is presented in **Table 3**. These figures were calculated in consideration of the above event probabilities for 1,000 individuals. Introducing a support program in the simulation resulted in an increase in both the number and cost of sick days, attributable in part to the significantly reduced number of dropouts, leading to more employees remaining with the organization.

Considering the costs associated with participating in a PSP (approximately €550), the avoidance of sick days in specific cases (€500/day), and the costs of refilling a position in case of

dropout (€75,000), an average cost saving of €6,672 per healthcare worker participating in the support program was determined using a three-stage Markov model, compared to non-participation. Main reason for the reduction is the reduction of dropouts, whereas the costs of sick day leaves are only moderately affected. The expected annual budgetary impact of implementing the support program is estimated to be approximately €6,67 Mio in the considered hospital. Additionally, the anticipated benefits of the support program, apart from reduced absenteeism, stem from increased job satisfaction, and lower staff turnover, ultimately enhancing patient care and preserving the hospital's financial resources.

Sensitivity Analysis

A number 100,000 stochastic trajectories were generated of pairs (non-PSP, PSP) scenarios. 29.0% of the non-PSP trajectories remained without any HIE-related effects (no sick leaves, no dropout). The figure rose to 36.9% in the PSP case. The 95% quantile of HIE-related costs was €79,443 without PSP, whereas the PSP scenarios exhibit 95% quantile of €68,222.

To test the robustness of the result in light of the uncertainties of our model parameters, we performed a Wilcoxon sign-ranked test. We applied the test in the one-sided version, with the null hypothesis that costs are higher without PSP than with PSP implemented. The hypothesis is significantly violated ($p < 0.0001$). Even after shifting the costs of the PSP variant homogeneously by adding an additional amount of 1,358.50 EUR, the hypothesis still can be rejected significantly ($p = 0.0490$).

DISCUSSION

Healthcare professionals need to be supported in order to be able to provide quality care after a HIE. Beyond positive medical and psychological outcomes, the provision of support services in hospitals has the potential for cost-effectiveness, a facet not previously evaluated in Germany. This study represents the first investigation, to our knowledge, into the economic impact of a PSP in a European hospital. By adapting a Markov Chain Model for the implementation of a PSP in the acute inpatient care sector in Germany, our results demonstrate substantial cost savings for the hospital, constituting significant value.

We estimated that the existence of a PSP in a hospital with 1,000 nursing employees in Germany enables savings of €6,67 Mio annually. These findings align with a cost-analysis conducted at Johns Hopkins Hospital, revealing potential savings of $1.81 million from the RISE program in a smaller sample of 80 nurses [38]. The main driver of the above result is the reduction of the probability to quit the job. Our assumption of a reduction from 0.68% to 0.34% is considerably smaller than the one in Moran et al., who assumed a drop from 1.22% to 0.34%. Therefore, we consider our results to be conservative.

The expected budgetary impact within the institution indicates economic potential even in medium-sized companies with 1,000 employees, despite not considering subsequent costs arising from reduced performance and indirect costs associated with unsafe work, estimated at 13% of total healthcare expenditure according to the OECD's recent publication in "The Economics of Patient Safety" [39], in our approximate model.

The calculations of the Markov Model resulted in the assumption that 14.3% of nursing staff quit their job in the course of a year. According to the German Hospital Report 2021 [40], this is in line with the current figures for staff turnover in German hospitals, where one in six change jobs every year [41]. The implementation of a PSP within the simulation exhibited a reduction of dropouts by 8.5% and a notable rise in both the quantity and financial impact of sick days. This increase of sick days can be attributed partially to a marked reduction in the number of dropouts, consequently fostering greater retention of employees within the organization.

The implementation of psychosocial programs for healthcare workers in hospitals has been shown to have a positive impact on employee wellbeing and organizational outcomes [42]. The role of employee programs and psychological wellbeing are important factors influencing job satisfaction, ultimately contributing to employee retention. PSPs are likely to facilitate hospitals in reducing turnover rates, improve healthcare worker resilience and enhancing the quality of care [43–45]. For instance, the implementation of such programs could increase the probability of healthcare providers arriving at work in an optimal state of wellbeing, thereby fostering a positive work environment conducive to the delivery of high-quality, safe care. Furthermore, providers may exhibit greater engagement and a heightened commitment to the organization as a result.

Our findings align with prior studies suggesting that hospitals with peer support positively impact employee retention [46, 47] and hospitals with poor nurse retention spend more than those with high retention [48]. While improving employee wellbeing contributes to reducing healthcare expenditure by minimizing the cost of work-related harm by up to an estimated 2% of healthcare expenditure, it also contributes to minimizing patient harm by up to an estimated 12% [49].

The occurrence of events leading to second victims can have cascading effects, including burnout and elevated turnover rates among healthcare providers, ultimately exerting adverse influences on the quality of future patient care and financial impacts on the hospital. However, comprehensive and easily accessible support programs tailored to healthcare providers in Germany remain absent on a national scale. Our research contributes to the existing evidence endorsing the integration of institutional PSP for healthcare providers into hospitals. We demonstrate that such adoption may yield financial advantages for hospitals, thereby further strengthening the case for their implementation.

The absolute values presented in this study are specific to Germany but the model can be universally applied once relevant data on sickness absence rates and personnel replacement costs are available. This underscores the adaptability and versatility of the model in assessing the economic impact of PSP on hospitals worldwide. By accounting for local variations in wage structures and wage replacement modalities, policymakers, managers, and

businesses can utilize this model to adapt and tailor interventions and strategies aimed at mitigating the adverse effects of second victim phenomenon in their respective regions.

The implementation of a PSP presents a proactive approach in addressing the inevitability of medical errors within clinical practice. Through widespread adoption across German hospitals, healthcare professionals gain immediate access to support following HIE, enabling them to recover and maintain quality patient care delivery. While the introduction of such programs incurs costs, the strategic provision of targeted support services aids affected individuals in managing negative consequences, ultimately yielding long-term economic benefits for the institution. The findings of this research indicate that implementing a PSP for medical providers could yield a significant return on investment for hospitals, thereby representing a beneficial value proposition for the healthcare institution.

Limitations

This study has limitations. Examining the precise impact of adverse events on healthcare professionals' decision to leave their medical or nursing roles is challenging due to the multifaceted nature of underlying factors. Whilst this study is focused on second victims, the impacts and consequences on their working environment are not considered. Reliable isolation of the effects of adverse events necessitates large-scale and resource-intensive studies, which might be difficult to conduct. The scope of this study shows a simplified perspective due to the scarcity of comprehensive data. Our analysis draws from available data, existing literature, and expert opinions. Indirect costs are not taken into account in the calculation and our expectations concerning the positive impact of PSP are cautious, which makes our results a conservative estimate and thus potentially underestimates the final outcome. Also not accounted for in the calculation were other professional groups that would also benefit from a support program. Findings and conclusions should be interpreted with caution, as the context and effects of peer support in healthcare settings may vary considerably.

Conclusion

Using a three-stage Markov model, our study reveals an average cost saving of €6,672 per healthcare worker participating in the support program compared to non-participation. While the absolute values may vary, the underlying framework remains universally applicable, enabling cross-country comparisons and informed decision-making in assessing the economic effects of support programs and addressing healthcare worker safety related challenges. Hospital managers are encouraged to recognize the advantages of cost savings and reduced staff turnover associated with establishing PSP, thereby addressing the critical issue of the second victim phenomenon in healthcare and improving health worker and patient safety. Systematic support, particularly by healthcare organizations and institutions, is crucial. Therefore, further studies on effective and immediate supervision and support strategies, along with legal frameworks in Germany, are needed to mitigate the adverse effects of unforeseen incidents on a Second Victim.

AUTHOR CONTRIBUTIONS

HR conceptualization, methodology, validation, formal analysis, writing–original draft, writing–review and editing. TN conceptualization, methodology, validation, formal analysis. RS conceptualization, formal analysis, writing–review and editing. JM conceptualization, formal analysis, writing–review and editing, supervision. All authors contributed to the article and approved the submitted version.

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CONFLICT OF INTEREST

The authors declare that they do not have any conflicts of interest.

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Study II.

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ORIGINAL RESEARCH

The Economic Implications of Psychosocial Peer Support for Health Workers in German Hospitals

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Purpose: The objective of this study is to evaluate whether the nationwide establishment and institutionalization of a peer-support program, is economically justified given the potential positive effects on the Second Victim Phenomenon (SVP) among healthcare professionals in Germany.

Methods: A comprehensive methodological approach was employed, using data from the SeViD studies to assess the prevalence and duration of SVP among physicians and nurses in Germany. Economic impact assessments were conducted to estimate the potential cost savings associated with implementing a peer-support program.

Results: The economic analysis reveals significant annual costs associated with SVP-induced absenteeism: approximately 1.56 billion euros for physicians and 1.87 billion euros for nurses. Implementing comprehensive peer-support programs could reduce these costs to approximately 0.85 billion (physicians) and 1.02 billion euros (nurses), respectively, demonstrating substantial potential economic benefits.

Conclusion: Investing in a structured peer-support program could yield annual savings exceeding 1.55 billion euros while enhancing workforce resilience and improving patient care. This underscores the economic rationale for scaling up peer support initiatives in healthcare settings.

Keywords: peer support program, economic impact, second victim phenomenon, healthcare professionals

Introduction

The physical and psychological burdens faced by healthcare personnel have become increasingly evident, especially since the COVID-19 pandemic.[1] Healthcare workers often encounter severe situations, including patient harm, fatal incidents, suicides among patients and colleagues, and personal assaults. Violence against healthcare workers, especially in emergency departments, remains a significant issue.[2,3]

In 2000, Albert W. Wu introduced the term "Second Victim" to describe healthcare providers traumatized by medical errors.[4] In 2022, the European Researchers' Network Working on Second Victims (ERNST) defined Second Victims as "any healthcare worker, directly or indirectly involved in an unanticipated adverse patient event, unintentional healthcare error, or patient injury and who becomes victimized in the sense that they are also negatively impacted".[5]

International studies highlight the widespread prevalence of severe events and resultant traumas among healthcare providers. Reported prevalence rates vary from 10% to 72.6% among respondents.[6–8] In Germany, the SeViD

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project assessed the incidence and impact of Second Victim trauma among healthcare professionals,[9] finding an overall prevalence of nearly 60% among physicians and nurses,[10,11] consistent with other recent international studies.[12]

Symptoms of Second Victims may vary and include distressing memories, anxiety, self-directed anger, regret, remorse and turnover intention.[13–15] Acute psychological reactions, such as acute stress reaction or post-traumatic stress disorder (PTSD), can occur depending on the severity of the event.[16] A 2019 health insurance report in Germany evaluating reasons for incapacity to work found that mental disorders are among the leading causes of sick leave for nursing staff.[17] A 2023 report by another German health insurance fund found that the healthcare sector had 434 sick days per 100 employees due to mental disorders in 2022, exceeding the average of 301 sick days per 100 employees across all sectors.[18]

The economic impact of severe events on healthcare personnel is significant. Absenteeism and presenteeism result in productivity losses.[19] In 2019, it was estimated that permanent incapacity can result in replacement costs of up to 30% of the annual salary, with vacancies lasting an average of 100 days and costing approximately 120,000 euros for senior doctor positions.[20,21]

Other countries have developed various support programs to reduce emotional stress reactions following Second Victim incidents. Examples include Resilience in Stressful Events (RISE),[22] forYOU,[23] and the Medically Induced Trauma Support Service (MITSS)[24] in the US; the open access online Second Victim support program MISE (Mitigating the Impact on Second Victims)[25] in Spain; Kollegiale Hilfe (KoHi) in an Austrian hospital;[26] and a support program in Switzerland.[27] Initial studies using validated tools like the Second Victim Experience and Support Tool (SVEST)[13,28] suggest these programs,[29,30] combined with a Just Culture approach, to reduce Second Victim Phenomenon (SVP).

In Germany psychosocial peer support has nationwide been successfully implemented for firefighters,[31] police and non-police emergency services,[32] in healthcare mainly for certain professional groups, special regions, individual hospitals[33,34] or as a model project.[35] Even though the economic value of peer support programs has been assessed in Germany for single hospitals, showing expected results of an average cost saving of €6,672 per healthcare worker participating in a peer support program,[36] these support programs primarily rely on voluntary commitments.[37,38]

Considering these insights, the economic impact of implementing a nationwide psychosocial support model in the German healthcare system needs to be evaluated.

Objective

This paper aims to quantify the potential direct cost savings for the German healthcare system from a nationwide implementation of a psychosocial first aid model consisting of peer support in larger facilities and anonymous telephone-based hotlines by projecting key figures from previous studies and assumptions to the number of healthcare professionals in Germany.

Materials and Methods

The analysis focuses on two primary aspects: estimating the economic damages associated with severe events that impair work capacity and result in long-term professional departure, and calculating the economic potential of peer-support programs by assuming these programs reduce the likelihood of such adverse outcomes. The scope is limited to the inpatient healthcare sector in Germany. The ethical permissibility of the study was confirmed by the Chair of the Ethics Committee of the State Medical Association of Hesse (Landesärztekammer Hessen), who reviewed the case and granted a waiver in lieu of ethical approval, as no sensitive personal data or vulnerable subjects were involved.

Data Sources

The primary data sources for this study include the SeViD-I[10] and SeViD-II[11] studies. Both studies are cross-sectional investigations, which provide prevalence rates of the SVP and estimates of impairment duration among

medical and nursing staff in Germany. The first study, conducted in 2019, focuses on young internal medicine physicians, reporting a 59% prevalence of SVP.[10] The second study, carried out in 2020, examines nurses, identifying a 60% prevalence.[11] Both studies utilized the "Second Victim im deutschsprachigen Raum" (SeViD) questionnaire, which includes sections on general SVP experiences, symptoms, and preferred support strategies.[9] A comprehensive literature review informs the assumptions and parameters used in the analysis. Two expert estimates by leaders in healthcare management concerning the recent cost for replacement of staff supplement the data. Both experts gave informed consent that their estimations were used anonymously for scientific purposes including further publication.

Methodology

The methodology is structured as follows: First, we estimate the annual nationwide incidence of SVP among doctors and nurses in German inpatient care as well as the burden of disease expressed by self-reported duration of symptoms. Annual incidence rates and impairment duration are based on surveyed data from the SeViD studies.[10,11] The figures for doctors and nurses were obtained from the Federal Statistical Office of Germany.[39]

Next, the economic damage associated with these severe events is estimated. This includes calculating costs related to absenteeism due to lost productivity from Second Victim trauma, and assessing replacement costs associated with long-term departures, which encompass recruitment, training, and temporary staffing expenses. Expert estimation is used to calculate costs associated with absenteeism due to lost productivity (estimated at 411 euros per day of absence for doctors and 137 euros per day for nurses) and estimate replacement costs (150,000 euros for doctors and 50,000 euros for nurses).

The study then calculates the economic potential of peer-support programs by assuming these programs reduce the probabilities of adverse outcomes. The potential cost savings are calculated by considering reductions in absenteeism, and replacement needs. The reduction for adverse outcomes due to peer-support programs is estimated based on data from international studies.[22,23,25] We estimate a reduction of duration of symptoms by assuming that the distribution of durations is shifted towards shorter values. The distribution of absence durations before implementation of peer-support programs is taken from the SeViD studies.[10,11] As durations in these studies were recorded as grouped data (up to one day, up to one week, up to one year, more than a year) we chose the lower bound of the class intervals in our model. The model estimates annual savings. Hence, the class corresponding to "more than a year" is considered to account for both individuals, who return only after a break of more than a year, and individuals leaving the profession altogether. Taking the midpoint of the class intervals instead of the lower bound would lead to substantially higher positive predictions.

To ensure robustness, a sensitivity analysis is conducted to evaluate how variations in key assumptions—specifically shifting 50% of the probability weight of each duration to the next shorter level—impact the overall economic impact estimates, with additional calculations performed using shifts of 75% and 25% to assess the sensitivity of this assumption and understand the range of potential economic benefits from the peer-support programs.

In the final step, two scenarios were compared: 1. The baseline scenario corresponding to the situation without implementation of a nationwide peer-support program; 2. The intervention scenario estimating the total economic damages with the peer-support program in place, by assuming a reduction in absenteeism and turnover.

Results

Based on the methodological approach outlined, we present the following estimates focusing on the inpatient sector.

Prevalence, Burden of Disease and Economic Yield in Physicians

According to the SeViD-I study, the 12-month prevalence of SVP among young doctors is reported at 36%.[10] Extrapolating this prevalence across other age groups and considering the total number of hospital-employed physicians in Germany (207,388 by the end of 2022), approximately 74,660 doctors are expected to experience SVP-related impacts annually.

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Table 1 Comparison of Scenarios for Physicians: Scenario 1 is the Baseline Scenario Corresponding to the Situation Without Implementation of a Nationwide Peer-Support Program; Scenario 2 is the Intervention Scenario Corresponding to the Situation with Implementation of a Nationwide Peer-Support Program; Upper and Lower Limits According to Sensitivity Analysis

	Scenario 1	**Scenario 2**	**Upper and Lower Limits**
< 1 day	0.045	0.209	0.127 / 0.291
< 7 days	0.328	0.337	0.332 / 0.341
< 1 month	0.345	0.255	0.300 / 0.209
< 1 year	0.164	0.141	0.153 / 0.130
> 1 year	0.118	0.059	0.089 / 0.030

The SeViD-I study also provides self-reported estimates on the duration until full recovery from SVP. Table 1 shows the duration of recovery in both scenarios. Applying these durations, the economic impact of physician absenteeism due to SVP is estimated to be 1.56 billion euros in scenario 1 and 857.3 million (506.6 million/1.21 billion) euros (lower limit – upper limit) in scenario 2 resulting in a total reduction of 701.4 million (1.05 billion/350.7 million) euros (difference lower limit – upper limit) for physician absenteeism.

Prevalence, Burden of Disease and Economic Yield in Nurses

SeViD-II reports an annual SVP incidence of 29%[11] among nurses. Considering there are 509,104 nurses in Germany, approximately 147,640 nurses will be affected by SVP annually.

Table 2 shows the duration of recovery in both scenarios for nurses. Estimated annual cost of nurse absenteeism totals to 1.87 billion euros in scenario 1 and 1.02 billion (1.45 billion/597.8 million) euros (lower limit-upper limit) in scenario 2. Therefore, introducing widespread peer support programs for nurses in German hospitals could reduce this cost to approximately 847.9 million (423.9 million/1.27 billion) billion euros (lower limit-upper limit) annually.

Table 2 Comparison of Scenarios for Nurses: Scenario 1 is the Baseline Scenario Corresponding to the Situation Without Implementation of a Nationwide Peer-Support Program; Scenario 2 is the Intervention Scenario Corresponding to the Situation with Implementation of a Nationwide Peer-Support Program; Upper and Lower Limits According to Sensitivity Analysis

	Scenario 1	**Scenario 2**	**Upper and Lower Limits**
< 1 day	0.045	0.161	0.103 / 0.219
< 7 days	0.232	0.274	0.253 / 0.295
< 1 month	0.316	0.246	0.281 / 0.210
< 1 year	0.175	0.204	0.189 / 0.218
> 1 year	0.232	0.116	0.174 / 0.058

Overall Economic Impact

The combined economic impact of reduced absenteeism and turnover among both physicians and nurses, facilitated by effective peer support programs, is estimated to exceed 1.55 billion (774.6 million / 2.32 billion) euros annually within the inpatient healthcare setting in Germany.

Discussion

Our study underscores the substantial economic benefits of establishing and institutionalizing peer support structures across Germany with a total economic yield of 1.55 billion euros annually for German hospital sector.

It is important to note that these estimates represent a conservative approach, focusing solely on the direct effects of absenteeism and turnover of nurses and physicians. Indirect effects of presenteeism such as delayed access to treatments or increased error rates among staff working despite impairments were not included, highlighting further potential benefits that are not quantified here.

The economic impact of SVP-induced absenteeism is striking. Even if a complete elimination of the problem through peer support programs is not to be expected and a run-in phase for the acceptance of this aid is to be assumed, implementing peer support programs has the potential to mitigate SVP-related costs significantly, whereby the freed-up funds could be invested in the sustainable stabilization of the healthcare system.

These findings align with previous literature highlighting the detrimental effects of SVP on healthcare professionals' well-being and organizational outcomes.[36,40] For instance, studies have documented higher rates of burnout, decreased job satisfaction, and increased turnover intentions among healthcare workers affected by SVP.[7,41] By contrast, results of first peer support programs have been shown to enhance psychological resilience, improve coping mechanisms, and foster a supportive work environment.[42–45]

Understanding the economic implications of the SVP and the potential mitigating effects of peer support programs is inherently complex due to several methodological and contextual challenges. The multifaceted nature of healthcare professionals' responses to severe incidents complicates the direct attribution of outcomes solely to these events. Decisions to leave the medical or nursing profession are influenced by a multitude of factors beyond individual traumatic experiences, including organizational culture, workload, and personal circumstances.[46–50] Thus, isolating the causal relationship between Second Victim incidents and subsequent economic outcomes presents a considerable challenge.

The identified cost savings do not fully capture the broader context, such as the well-being of healthcare professionals or the potential impact on team members whose performance may be affected, which could, in turn, influence patient outcomes. Additionally, while defensive measures highlight the importance of addressing the issue, their associated costs have not been factored into the analysis.

Psychosocial peer support programs offer crucial benefits for healthcare workers, enhancing their mental well-being and resilience. These programs help reduce social isolation, provide emotional support, and complement traditional professional services, creating a sense of community among participants.[44,51] Interventions that address the psychosocial needs of health workers provide both qualitative improvements in care and substantial economic benefits, highlighting their importance in healthcare settings. It is essential that healthcare authorities and decision-makers gain a deeper understanding of this issue and that planning and management teams integrate the SVP into the development of personnel policies. The investment in peer support programs is likely to be offset by the significant benefits these initiatives bring, including improved staff well-being and enhanced patient safety.

Limitations

While our findings highlight promising economic benefits, it is crucial to acknowledge the study's limitations. Given the constraints of the available data and the current state of research, this study adopts a simplified approach. Our simplified approach, relying on available data and expert assessments, inherently involves uncertainties with need for cautious interpretation and further research. On the one side, the assumption of recovery time as a direct surrogate for absenteeism may not accurately reflect the true nature of the condition, as it likely represents a mix of absenteeism and presenteeism. Considering the potential impact of presenteeism, which could lead to medical errors and substantially higher costs than

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absenteeism, we still consider this a conservative approach for cost estimation.[52–54] Additionally, the calculation using self-reported one-year prevalence may be scrutinized, as high prevalence should affect the whole population over time. On the first view, this conflicts with the self-reported lifetime prevalence of about 60%. Explanations comprise the under-investigated roles of self-reporting bias, social desirability, self-concepts, resistance and resilience to the effect, accumulation of the effect in vulnerable persons and the temporal course of Second Victim experience. However, we preferred the use of the one-year prevalence as most of the impact of SVP also appeared in this period, and experiences may change over time.

The identification and quantification of severe incidents among healthcare professionals rely predominantly on self-reported surveys rather than standardized, objective criteria. This methodological limitation introduces uncertainties in accurately assessing the prevalence and severity of Second Victim incidents, potentially underestimating their true impact.

Future research should address these gaps to provide a more comprehensive understanding of the broader economic implications and the full spectrum of benefits associated with peer support in healthcare.

Conclusion

The economic benefits of psychosocial peer support programs for healthcare professionals to mitigate the effects of SVP among physicians and nurses in Germany are substantial and underscore the need for strategic investments in supportive interventions. Our study provides a conservative estimate of annual cost reductions of 1.55 billion (774.6 million/ 2.32 billion) euros (lower limit-upper limit) through reduced absenteeism and turnover alone, emphasizing the potential return on investment for healthcare institutions. To strengthen the case for implementing such programs, future research should explore additional dimensions of economic impact, such as improved patient safety, enhanced job satisfaction, and the long-term effects on workforce sustainability. Furthermore, the integration of psychosocial peer support programs into existing healthcare infrastructures should be examined to identify best practices and optimize their effectiveness. Policymakers and healthcare administrators are encouraged to consider these findings when allocating resources to mental health and well-being initiatives, as the potential benefits extend beyond cost savings to include improved care quality and staff retention.

Ethical Statement

This study does not involve any individual, animal or patient data, as it is an economic analysis based solely on publicly available data sources.

Disclosure

The authors report no conflicts of interest in this work.

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