

# Supporting Family Care: A Systematic App Review

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## Research Article

**Keywords:** Informal caregiver, Mobile applications, mHealth, Need domains, Target groups

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# Abstract

**Background:** Mobile applications (apps) provide family caregivers of people with chronic diseases and conditions with better access to support and information. However, thorough understanding of how these apps meet the main needs and requirements of the users is currently lacking. The aim of this study was to review the currently available apps and evaluate their relevance to (1) caregivers' needs in main caregiving domains, (2) caregivers' personal needs, and (3) different caregivers' groups.

**Methods:** We conducted a systematic review on apps for family caregivers on two major app stores: Google Play Store and iOS App Store. Apps were included if the main target group were family caregivers. Data were extracted from the app descriptions found in the app stores.

**Results:** The majority of the apps assisted caregivers in their caregiving activities. Apps were rarely tailored to specific groups of family caregivers and their needs. Further, apps addressing caregivers' personal health, financial security, and work issues were scarce. Commercial apps dominated the market, often intermediating paid services or available for users of specific hardware. Public and non-profit organizations provided best-rated and free-of-charge apps but had a very limited range of offers with focus on caregivers' health and training.

**Conclusions:** Our results indicate that current apps for family caregivers do not distinguish specific groups of family caregivers, also they rarely address caregivers' personal needs.

## Background

Due to increasing average life expectancy and decreasing average birth rates there is worldwide a growing number of people with chronic diseases and conditions in need of care, thus increasingly challenging health and care systems [1]. Family caregivers provide a bulk of long-term care [2]. However, caring for people with chronic diseases or conditions is often complex and results in high burden for caregivers [3]. Support offers aim to provide family caregivers with vital information, skills, and support, but caregivers rarely make use of them [4]. Some researchers suggest that the reason for the low use is that current support offers are often hard to access, require high costs, and rarely meet caregivers' needs [4, 5].

## Mobile apps for family caregivers

Mobile applications reveal a new area of support offers as they empower caregivers through better access to health care assistance and information. Family caregivers use apps to track the health status of the care recipient, learn more about caregiving, and communicate with other caregivers or health care providers [6]. There is an increased belief in the benefits of apps since they can improve self-management, skills, health, and quality of life of family caregivers [7–11].

The market of mobile applications is dynamic and complex, thus presenting a challenge for users to find appropriate solutions but also for app providers to identify unmet needs of their potential users. There are only a few reviews that described mobile applications for family caregivers and concluded that apps mainly address care recipients without sufficient regard to family caregivers [12, 13]. However, it remains unclear what needs and target groups of family caregivers are currently addressed by available apps. Understanding the ability of current mobile offers to meet the information and support needs of family caregivers is crucial if mobile solutions are to support informal care effectively.

## **Family caregivers' needs**

Family caregivers' needs have been widely investigated resulting in two overriding categories: the needs for support in caregiving activities [14, 15] and the needs for support for caregivers' personal needs [16, 17].

Family caregivers usually perform a number of caregiving activities and report the need for information and support regarding those activities [18]. In the current study we consider five main caregiving domains: (1) personal care, (2) medical care, (3) household assistance, (4) support in organizational matters, and (5) supervision and social support. Personal care is the assistance with daily activities such as bathing, dressing, and nutrition and assistance with mobility [19]. Caregivers also provide medical care such as wound care, injections, and giving medicine [15]. Household assistance (shopping, laundry, or meal preparation) represents the third domain in our study [15]. Fourth, support in organizational matters denotes activities such as making doctor appointments, ordering medicine, or speaking with health professionals [20]. Finally, supervision and social support comprises looking after the care recipient, talking, walking, and doing joint leisure activities with him/her [15].

Providing informal care may affect caregivers' professional, social and private life [21]. Therefore, it is important to consider not only the support needs of family caregivers in caregiving domains but also caregivers' personal needs related to their own health and life [16, 17]. Our study defines five domains of caregivers' personal needs: (1) maintaining one's own physical and mental health, (2) social contacts and exchange of experiences, (3) work and care, (4) financial security, and (5) free-time opportunities and other activities.

Finally, previous research also showed that caregivers do not represent a homogeneous group [22]. They take on different caregiving responsibilities and face different care situations. A working daughter, who takes care of an elderly parent, has other needs than a retired husband taking care of his wife with dementia. Caregivers' groups can be characterized by the care situation (e.g. time and duration of care) as well as caregiver's sociodemographic factors (e.g. gender, age and employment). Caregivers in different groups have specific needs that should be considered when assessing support offers.

## **Objectives**

The aim of this study was to review the currently available apps in terms of their relevance to (1) caregivers' needs in five main caregiving domains, (2) five main domains of caregivers' personal needs,

and (3) different sociodemographic groups of caregivers and caregiving situations.

Effective services and supports are based on the in-depth understanding of users' perspectives. Family caregivers need specific information and support depending on their individual situation. Understanding their specific needs and different target groups is of primary importance to provide optimal support. App providers and public authorities could consider the current findings to develop effective support apps oriented toward caregivers' needs and communicate them to potential users' in different target groups.

## Methods

### Overview

We applied a systematic review methodology commonly used in previous app reviews to identify and characterize apps for family caregivers [23, 24]. In February 2021, we conducted a systematic search in Google Play for Android and in App Store for iOS. One author recorded the titles and the description of the apps and both authors assessed the sample for eligibility.

### Selection Criteria

To identify apps addressing family caregivers it was decided to choose the following search terms: "caregiver", "carer" and "caregiving". We also included the same term in German: "pflegende Angehörige" und "informelle Pflege". Apps addressing specifically informal caregivers or both informal caregivers and the care recipient were included for further analysis. Apps developed for professional caregivers or caregiving organizations were excluded. Duplicates and irrelevant apps were also excluded.

### Data extraction and coding

We collected information based on the description in the app stores and inspected the websites for the apps that provided unclear store descriptions. The following information was extracted: apps store category, cost, provider name, number of downloads, rating, main purpose, main features, and user target groups.

We generated a coding scheme to describe the types of support and target groups of apps based on previous literature on family caregivers' needs and target groups [15–17, 25]. Using this coding scheme, one of the authors extracted the data and gave a binary code to each variable (1, if a given app provides support on a specific domain/ targets a specific group; 0, otherwise), the other author reviewed. The final coding scheme is outlined in Table 2.

## Results

### Results of the search strategy

First apps in English were identified in Google Play Store and iOS App Store by searching the chosen terms: caregiver (367 results), caregiving (311 results), and carer (450 results). Then apps in German were identified by using search terms “pflegende Angehörige” (248 apps) and “informelle Pflege” (251 apps). A total number of 1.627 apps resulted by the search terms. 771 duplicates were identified and excluded. 856 apps were screened to select relevant apps according to their titles and their description in the store. Apps addressing specifically informal caregivers or both informal caregivers and the care recipient were included for further analysis. 713 apps that did not meet the inclusion criteria were excluded. A total number of 143 relevant apps were selected for the current analysis.

## General features

Of the 143 apps identified by the search strategy, 74 apps were solely found in the Google Play Store, eight apps originated solely from the iOS App Store, and 61 apps were found in both repositories. About 46% of the apps were in the category for Health and Fitness, 25.2% were marketed for Medical purposes, while the rest were divided across social networks (7%), education (6.5%), lifestyle (4.9%), and others (10.1%). Around 81% of the apps were offered free of charge, 17 % offered in-app purchases and 2.1% had a download fee. The lowest price of the paid apps was 0.99 USD and the highest price was 199 USD for a timely unlimited premium account. The average price for in-app purchases or app downloads was 14 USD in Google Play Store and 19 USD iOS App Store. There were much fewer ratings in the iOS App Store (8.3%) than in the Google Play Store (50.3%). On average, in both stores 55.8% of users reported high ratings between 4 and 5 (the maximum score), 31.2% reported average ratings between 3 and 4), and 13% reported poor ratings between 1 and 3. The download numbers relate only to apps within the Google Play Store: A majority of the apps had a low number of downloads with 77.8% below 5.000 downloads and 97% below 100.000 downloads. The most downloaded app was an intermediary platform with one million downloads and more. The largest portion of apps (86.7%) in both repositories were offered by private enterprises. Public authorities or institutions (health centers, universities, or hospitals) offered 4.9% of the apps, 5.6% of the apps were provided by non-profit organizations (caregivers associations or self-help groups), and 2.8% by private persons (Table 1).

Table 1  
General features

<b>General features</b>	<b>n (%)</b>
App Store	
Google Play	74 (51.7%)
iOS App Store	8 (5.6%)
Both	61 (42.7%)
App store category	
Health and Fitness	64 (46%)
Medicine	35 (25.2%)
Social networks	10 (7%)
Education	9 (6.5%)
Lifestyle	7 (4.9%)
Other	14 (10.1%)
App Costs	
Free of charge	108 (80.9%)
In-app-purchases	22 (17%)
Pay per download	3 (2.1%)
Highest price (US-Dollar)	0.99 USD
Lowest price (US-Dollar)	199.0 USD
Average price (US-Dollar)	14 USD (Google Play); 199 USD (App Store)
Rating	
High (4–5)	43 (55.8%)
Middle (3–4)	24 (31.2%)
Low (1–3)	10 (13.0%)
Downloads	
up to 100	26 (19.3%)
100–500	28 (20.7%)
500–1000	17 (12.6%)
1000–5000	34 (25.2%)

General features	n (%)
5000–10.000	11 (8.1%)
10.000–50.000	13 (9.6%)
50.000–100.000	2 (1.5%)
100.000 and more	4 (2.9%)
Provider	
Private Enterprise	124 (86.7%)
Public Institution	7 (4.9%)
Non-Profit Organization	8 (5.6%)
Private Person	4 (2.8%)

## Types of support

Almost all apps aimed at supporting caregivers in one or several caregiving domains; the number totaled to 131 accounting for 90% of all apps tested. About one-fifth of the sample were apps that support the arrangement of professional services (21%) in all five caregiving domains. Such apps represented service providers or market intermediaries that help family caregivers and providers to interact with each other. Further, apps offered information (25.2%), consultation (9.8%), and training (4.9%) on all five main caregiving domains. These apps provided tips, advice, guidance, and education on caregiving and delivered telemedical counselling. Further, apps offered support in organizational matters that include for example a calendar and organizer to coordinate caregivers' activities, medication and appointment reminders, checklists and documentation tools (20.3%). Finally, about 36% of apps helped caregivers in providing supervision and social support for the care recipient. The common features were tracking health state and geolocation, fall detection, and instant connection. Some apps in this category supported joint leisure activities between the caregiver and the care recipient.

Apps for supporting caregivers' personal needs accounted for only 24.1% of the sample. Most of these apps promoted social contacts and experience exchange between caregivers (11.9%). Few apps (6.9%) helped caregivers to maintain their physical and mental health by providing information on self-care and psychological consultation. Five and half percent of the apps addressed the need for financial security by providing information on available benefits and measures for financial support of informal care. Finally, apps offered support for working caregivers to allow them to better combine work and care responsibilities (4.1%). There were no apps found addressing the need for caregivers' free time and leisure activities.

## Target groups

Almost half of the sample (46%) did not differentiate target groups of family caregivers. One of the largest target groups was caregivers of people with specific conditions (19.6%). The majority of these apps were aimed at supporting caregivers of people with dementia and Alzheimer’s disease. Further 18.9% of the apps addressed caregivers for elderly. Only 2.8% of the apps account for the sociodemographic characteristics of the caregiver with one app addressing young adult caregivers and three apps targeting employed caregivers. Some apps were available only for clients of care agencies or long-term care institutions (2.1%). About twelve percent of the apps were aimed at supporting users of specific hardware such as sensors, tablets, or cameras. Table 2 provides an overview of the types of support and target groups addressed by the apps in the sample.

Table 2  
Types of support and target groups

<b>Types of support</b>	<b>n (%)</b>
Support in caregiving domains	
All caregiving domains	
Intermediaries and providers of services	30 (21%)
Information on caregiving	36 (25.2%)
Consultation on caregiving	14 (9.8%)
Training on caregiving	7 (4.9%)
Support in organizational matters	29 (20.3%)
Supervision and social support	52 (36.4%)
Support for caregivers’ personal needs	
Maintaining caregivers’ own health	10 (7%)
Social contacts and experience exchange	17 (11.9%)
Work and care	6 (4.2%)
Financial Security	6 (4.2%)
Target groups	n (%)
All caregivers	67 (46.9%)
Caregivers for elderly	27 (18.9%)
Caregivers of people with specific condition(s)	28 (19.6%)
Specific sociodemographic groups of caregivers (e.g. age)	4 (2.8%)
Clients of a health care or insurance company	3 (2.1%)
Users of specific hardware to support care	17 (11.9%)

# Types of support across ratings, providers, and payment modalities

Reviewing the types of support according to the user rating (Fig. 1) revealed that more than 80% of the apps offering information, consultation, and training on caregiving had high ratings (4–5). Most positively rated apps offered training on caregiving (100% with ratings 4–5). Also, high ratings achieved apps that addressed caregivers' health (100% with ratings 4–5) and financial security (80% with ratings 4–5). The lowest proportion of high ratings was among apps that provided support in organizational matters.

Comparison of apps according to the app providers (Fig. 2) revealed that in almost all types of support provided by apps, private enterprises dominated over the public and non-profit organizations. Especially high was the number of private enterprises among intermediaries and providers of professional services as well as apps supporting supervision and social support: private providers accounted for more than 90% of the apps. In contrast, the best-rated types of support, training on caregiving domains, and support in maintaining caregivers' own health were more often provided by public and non-profit organizations: private providers accounted for about 60% of the apps.

Figure 3 provides a breakdown of the support offerings of the apps according to whether apps were free or paid. The proportion of paid apps varied across types of support but accounted for not more than 33.3%. There were no payment requirements among apps offering training on caregiving and apps supporting caregivers in maintaining their own health. Low proportions of paid apps were among apps offering consultation on caregiving (7.1%) and among apps supporting social interaction and experience exchange between caregivers (5.9%). An especially high number of paid apps was in the category among apps providing support in organizational matters (27.6%). The highest number of paid apps was among apps supporting caregivers' financial security (33.3%).

## Discussion

This study explored if and how mobile apps for family caregivers meet their needs. According to the previous research, apps are not sufficiently focused on the needs of family caregivers [13, 26]. We evaluated systematically what needs and target groups of family caregivers are addressed by available apps. This study collected data from the two main app stores, Google Play Store and iOS App Store, and analyzed the content of 143 apps for family caregivers. We relied on a set of main domains of caregiving and caregivers' personal needs derived from previous empirical research [15–17, 25]. Our results show discrepancies between the types of support provided by current offers and caregivers' needs that could be of high interest for app providers and policymakers. Based on our results, support offers could be better adapted to the specific needs of family caregivers.

Overall, our analysis showed that apps mainly support caregivers' needs in caregiving domains and are less targeted at caregivers' personal needs. In the following, we discuss in detail how identified apps

match the main caregiving and personal need domains along with the target groups of family caregivers.

## Caregiving domains

The current apps offered extensive assistance in supervision and social support caregivers provide for the care recipient. Most of these apps were commercial and aimed at tracking care recipients' health, state, or location on distance, which raises a number of privacy concerns regarding the use of collected personal data. Further, some apps required specific paid hardware like sensors or cameras even though the use of apps was mostly described as free of charge.

Another widely addressed caregiving domain is the support in organizational matters, which is very important since caregivers often find it difficult to interact with the health care system [27]. However, such apps contained mainly calendar, reminder, or documentation features and rarely addressed issues with caregiving arrangements and related bureaucracy. These apps were mostly commercial with a relatively high proportion of in-app purchases and relatively low ratings compared to other categories.

Further many commercial apps were engaged in intermediation between family caregivers and providers of paid health care services. Direct technical assistance of caregivers in carrying out personal and medical care was not very common.

Especially high ratings received apps that offered information, training, and counseling on caregiving. There were more public and non-profit providers involved and fewer in-app purchases or other hidden costs for users. The best-rated category was training on caregiving with the highest proportion of public and non-profit providers and no paid apps. In total there were only few apps offering this type of support.

## Personal need domains

As to the personal need domains, apps mainly addressed caregivers' need for social contacts and experience exchange through social networks, forums, and support groups. There were only a few apps addressing caregivers' own health. This is an important result since it is known from the previous research that many caregivers need support in maintaining their own physical and mental health [16]. More often public and non-profit organizations offered support in maintaining caregivers' own health, and these few apps were more often highly rated by users.

Work and financial security are other important need domains since many caregivers have to combine work and caregiving, or even give up work completely, which leads to significant financial losses [28]. Our results show a clear lack of offers to support the work and the financial security of caregivers. Further, it is important to notice that from the relatively small number of apps offering information and support in financial issues the proportion of paid apps was the highest. From a public health perspective, especially caregivers in difficult financial situations should be informed about available financial support without cost barriers. Finally, there were no apps found supporting the free time and leisure activities of caregivers.

# Target groups

Previous research results indicate that caregivers appreciate support targeted at their situation [29]. Family caregivers is a heterogeneous group with different needs and caregiving situations [22, 30]. Surprisingly, current applications are rarely tailored to specific groups of family caregivers, for example, young or working caregivers. An exception were a relatively high number of apps for family caregivers for people with specific diseases and conditions such as dementia. However, we were not able to find any apps addressing older caregivers, spouse caregivers, or men caregivers. These highly burdened groups of family caregivers could benefit from support offers targeted to their specific needs [22].

Our results have shown that commercial providers currently have little focus on the needs of the caregivers. Public and non-profit organizations are trying to fill the gap by providing assistance aimed at the caregivers' own needs. However, these efforts are scarce, and the proportion and diversity of these applications is very small. In addition, we found that two best-rated types of support, training on caregiving and support in maintaining own health, are more often provided by public and non-profit organizations free of charge. Public agencies could lay more focus on the development of support apps that meet caregivers' personal needs such as maintaining own health, combining work and care and having enough financial resources.

## Limitations

Our research has also some limitations. First, our results are based on the information provided in the app description in the stores. Future research could provide a more detailed insight for a sample of apps for caregivers after downloading and testing features. Second, due to the constant addition and removal of apps from the market, the result list has a narrow window of validity. Finally, the search was conducted in Germany. Replicating the results in another country might lead to different results.

## Conclusions

In this paper, we systematically reviewed mobile apps for family caregivers on two major app stores, Google Play Store and iOS App Store. We described the types of support provided by apps and analyzed their relevance to meet the main domains of caregivers' needs. We showed that apps mainly assisted caregivers in their caregiving activities and were rarely tailored to caregivers' health, financial issues or specific target groups. Our results are of high importance for the future development of the effective digital support offers.

## Declarations

## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

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## Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

## Authors' contributions

Both authors KB and SBJ have made substantial contributions to the conception and design of the study. KB conducted the review of the literature and the data collection and developed the initial draft of the manuscript with significant input from SBJ. SBJ mentored KB, advised on data collection procedures and substantively contributed to the drafting and revision of the manuscript. Both authors analyzed the collected data, read and approved the final version of the manuscript.

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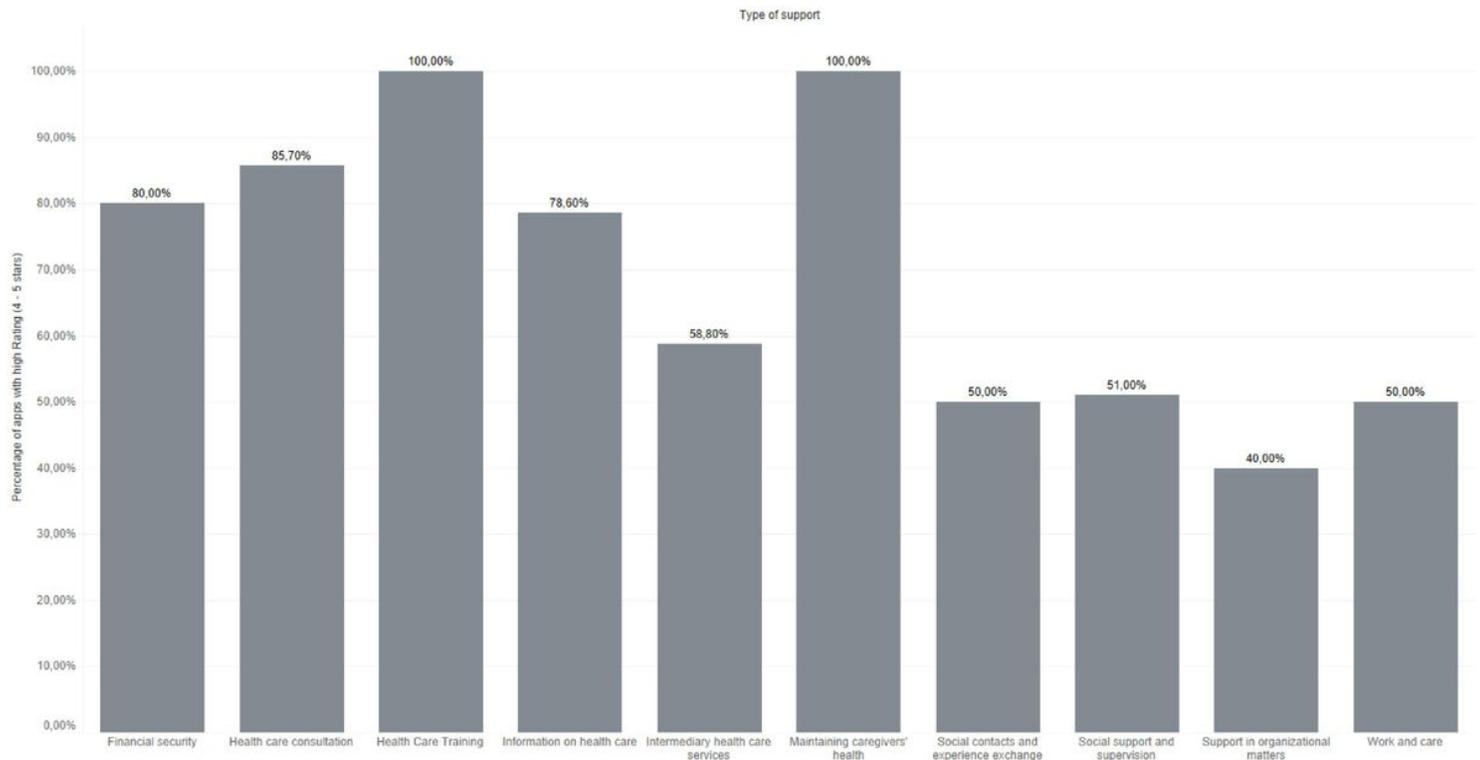
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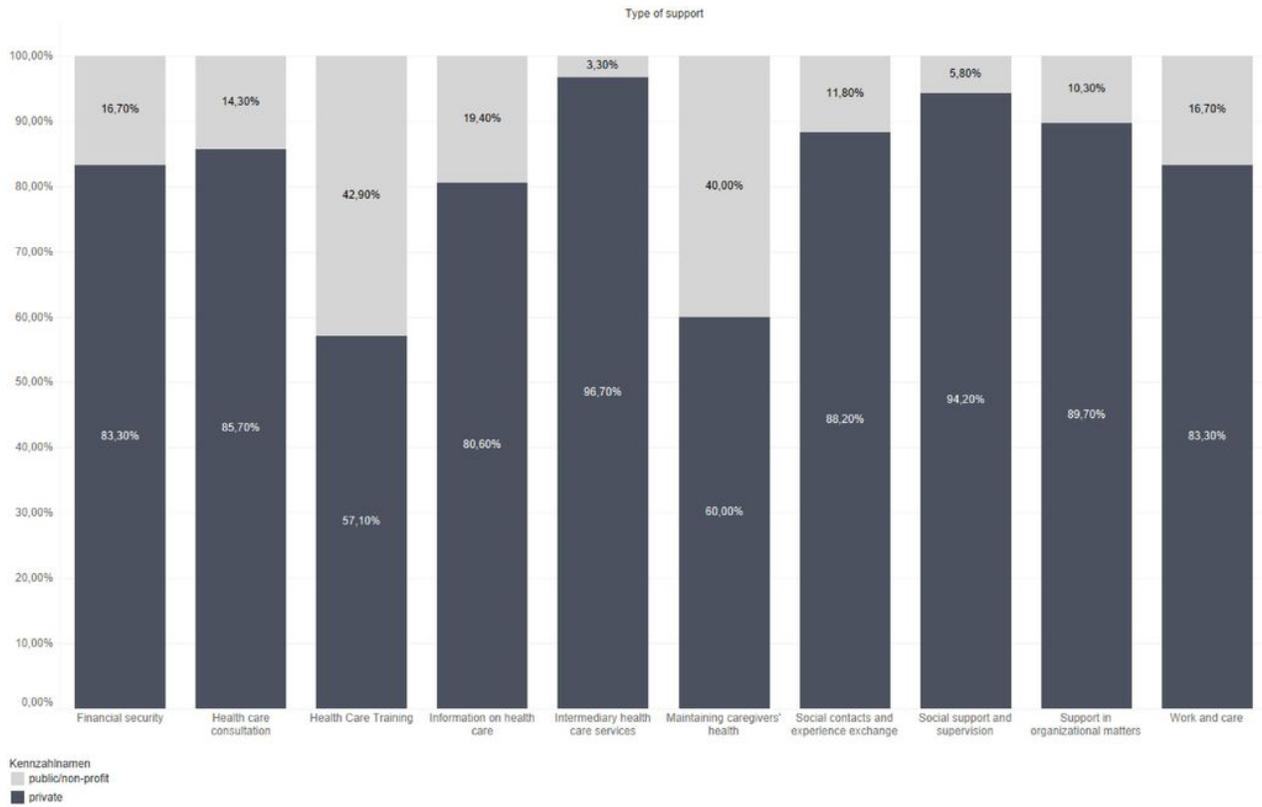
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## Figures



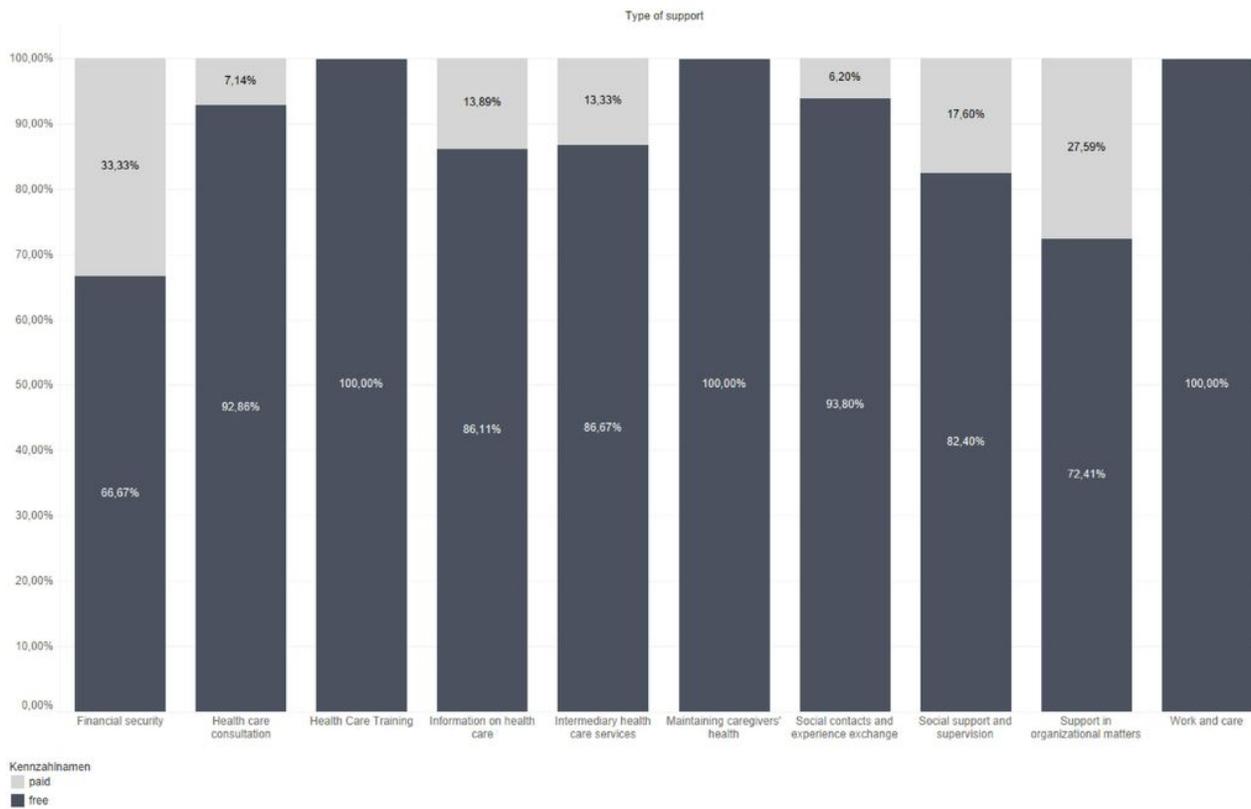
**Figure 1**

Chart comparing types of support across user rating



**Figure 2**

Chart comparing types of support across providers



### Figure 3

Chart comparing types of support across payment modalities