The Impact of Online Social Community Platforms on The Elderly Daily Activities: A Systematic Literature Review

Farhat Adbelrjal[a,b]   Nor Azman Ismail[b]   Salem Othman[c]

(a) *Department of Computer Science, Faculty of Computing and Information Technology,University of Ajdabiya, Libya.*

(b) *School of Computing, Faculty of Engineering, Universitiy Teknologi Malaysia (UTM), Malaysia.*

(c) *Department of Computer Science and Networking, Wentworth Institute of Technology Boston, USA*

Abstract

Background: Social integration can satisfy human's needs of being loved and wanted and so communication with other people like family and friends is very important. Online social communities can have a positive effect on elder people, especially those in the retirement age group and above.

Objective: To investigates the current-state-of-the-art of the online social community platform for the elderly and its effect on the elderly people's daily activities.

Method: A Systematic Literature Review (SLR) method is conducted to collect and review studies. Following a predefined review procedure, we identified 31 literature papers within the years 2015-2019 present research on online social communities for the elders. We analysed and classified the papers based on its themes and purpose, to understand the current state-of-the-art focus. This study further carves out the grey area in the domain with offers a related discussion and conclusions.

Results: The current-state-of-the-art is mostly focused on providing an easy interface for the elderly with social platforms. This is achieved either through integrating the social platform with commonly available household devices like TV, voice-to-command system for social media interaction or in developing specialized social media platforms. A lot of literature also try to combine health monitoring with social media. The positive impact of social media use is also studied across the literature.

Conclusion: There are still quite a few domain gaps in the current state-of-the-art as much literature avoids focusing on the active ageing part of an elder with social media integration. This domain can be explored better to provide a much more positive impactful and efficient social platform system for the elders.

Introduction

The elderly community is growing at a rapid pace and it is estimated that by 2050 there will be more than 2 billion people over the age of 60 around the world for the first time in history. Researchers from various fields divide the elderly ages into three groups. The "young-old" – aged between 60 and 75, the "old-old" – aged between 75 and 85, and the "very old" – those aged over 85. In this study, the focus is on the elderly age group between 55 to 70 years old, when the elderly are most likely to retire. At this retirement age, the elderly are more sensitive and are more likely to lack companionship and meaningful connections. This may be due to a number of factors such as living alone due to absence of partners or children, or living in remote locations, or health indicators like dementia, obesity etc. they lack purpose in life and this often leads to problems like loneliness and social isolation. It leads to

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depression and decreased physical activities. It is believed that loneliness and social isolation can be predictors of cognitive decline among seniors over the 65 years of age (James, Wilson, Barnes, & Bennett, 2011; Tilvis et al., 2004; Wilson et al., 2007). It is important to help elders to be functional in both a cognitive and physical way. Thus, there is a need to find a solution for the aged to adjust themselves to their late-life environment and to adapt to the changes in their physical and mental health. But at the same time, they need to be socially independent and have freedom while ageing actively.

Social integration can satisfy human's needs of being loved and wanted and so communication with other people like family and friends is very important. High levels of social participation in elders are linked with lower levels of psychological distress [Berry H], greater happiness and satisfaction. Technology can also play an important role in increasing the participation of elders in social interactions (AgeUK, 2011; Alaoui and Lewkowicz, 2013). Social networks are important and widely used tools for communication and sharing knowledge in today's world which play a big part in young people's lives.

In elderly people, loneliness and social isolation can have a very damaging effect on their overall health (Hafner, 2016; Nutt, 2016). Existing literature for improving the quality of life of elderly people mainly focus on the usage of social media for social connections as they connect meaningfully with their inner personalities and provide a platform for constructive exploration. A study by the American Psychological Association (APA) found that elderly people had elevated moods with a positive experience on social media which showed up in their daily activities. It interpreted that elderly people who spent much time on social media were more prone to be active by participating in different activities frequently leading to a better lifestyle and health. This also positively reflected in their daily life activities such as cooking healthier recipes and finding easier ways to clean or maintain their homes. Despite the complications of confusing user interface and too much information, social networks like Facebook, Twitter, Google Hangouts, Pinterest, and Instagram all detect higher adoption rates among the elders recently. Hence, in this paper, we systematically collect and review all the literature in this domain between 2015 -2019 to understand the current state-of-the-art and identify technology gaps that need further exploration.

The review method

As formerly stated, this study is a Systematic Literature Review a repeatable process combining all existing research literature related to a specific topic or particular research question (Budgen & Brereton, 2007). The main aim of performing this type of review is to collect, sum up and evaluate evidence about a particular area. This is undertaken so as to discover any research gaps within existing studies, thereby allowing for the recommendation of further research, and allowing for greater insight and deeper understanding into the phenomenon being addressed (Unterkalmsteiner et al., 2012). For this review, the authors have broadly followed the guidelines proposed by Budgen & Brereton (2007). These guidelines have established that a review should be comprised of three phases, including its planning, conducting and reporting. Each stage has sub-elements, including (1) identifying review questions; (2) determining data provider; (3) setting up inclusion and exclusion criteria; (4) studying quality assessment; (5) reviewing selection procedures and strategy; and (6) data extraction and the synthesis of evidence, so as to answer the research questions RQ1 to RQ5. Each step has been explained in turn, through the following sections:

1. Research questions

The purpose of this systematic lecture review (SLR) is to understand and summarize the empirical proofs as regard the state-of-the-art prioritization techniques and identify areas for further research in order to complement the performances of existing techniques. To achieve this aim, 3 research questions (RQs) were formulated as presented below:

RQ1: Is there a particular pattern that the current review studies can be categorized into?
RQ2: Are there online social communities that are designed for helping the elderly?
RQ3: To what extent the existing online social communities provide the appropriate assistance to the elderly?
RQ4: Do existing online social communities have a significant impact on the elderly's daily activities as well as improve their quality of life?
RQ5: What are limitations and gaps within current review studies about online social communities of the elderly and their effect on the elderly's daily activities?

2. Data sources

The search was conducted as an electronic search, using online scientific databases to address this review's research questions. Actually, databases are available through the library of the University Teknologi Malaysia (UTM). The online databases including IEEE explore, Scopus, Science Direct, and Web of science were selected as the main data sources for the current review. In fact, these online databases were obtained because they were deemed to be the most relevant, providing complete information for the field of social communities of older adults.

3. Inclusion and Exclusion criteria

The aim of applying inclusion and exclusion criteria is to ensure that all selected primary studies in the SLR are pertinent, and are related to the study. So, several inclusion and exclusion criteria are determined. First, with regard to literature availability, only articles are selected which means of not available in a full-text form are all excluded. Second, in order to avoid any confusion and difficulty in translating, the searching efforts excluded the non-English publication and focused only on articles published in English. Thirdly, with regard to the timeline, a period of 5 years is selected (between 2015 and 2019). As the review process focused on online social communities of older adults and their effect on older adults' daily activity as well as the quality of life, which means, articles published in social

Criterion	Inclusion	Exclusion
Literature availability	as full-text	had full text not available
Language	English	Non-English
Timeline	Between 2015 and 2019	Gray papers; i.e. papers without bibliographic information such as publication date/type, volume and issue numbers were excluded or >2015
research question	papers that answer at least one research question	Duplicate papers (only the most complete, recent and improved one is included). The rest are excluded

Table 1: The search string used for the systematic review process.

networks such as Facebook, Twitter, and Instagram and didn't focus on the elderly are excluded. Lastly, in line with its objective which focuses on online social communities, older adults and the impact on their daily activity and the quality of life only these articles are selected since they are relevant to this study. Others are excluded. However, Table 1 illustrates the eligibility and exclusion criteria which apply in this review.

4. studying quality assessment

Quality assessment of the selected papers by using a set of criteria helps while providing a decision regarding the interpretation and findings of the primary papers (Kitchenham, 2007). Thus, its recommended that authors conduct a quality assessment of their selected papers while reviewing them, as a way of evaluating the quality and accuracy of review studies - five QA quality assessment have been evolved for this review, as detailed below:

QA1. Is the topic addressed in the paper related to social media for Elderly Persons?

QA2. Does the research find new social connections for the Elderly within their particular location?

QA3. Does the research help in curbing the isolation of Elderly People by bringing in people for off-line activities?

QA4. Is the proposed system adequately described?

QA5. Is the system user-friendly for use by the Elderly?

The five quality assessment questions listed above used to study 31 selected studies papers. This assessment is done to strengthen the researchers' self-belief in the credibility of their findings. To grade the selected papers based on the quality assessment, high-quality level criteria has been used wherein three quality ratings were applied inclusive of 'high', 'medium', and 'low' (Nidhra et al., 2013). The quality of each study thus will be taken into consideration through the resulting load score. Based on the high-quality level criteria, the outcomes have been divided between three ratings. Firstly, if a paper completely fulfills the quality standards, in such a case it is assigned a rating of 2 for that criteria. Secondly, if a study partly fulfills a high-quality standard, its assigned a score of 1 for that standards. Lastly, if a study doesn't meet a quality standard, it becomes assigned a score of 0 for those standards. consequently, with regards to the 5 quality standards, a study's highest possible score is 10 (or 5×2), while its lowest possible rating is zero (or five × zero). In this review, the best of each paper turned into considered to be high if it scored greater than or same to 7. A paper which scored six becomes considered to be of medium quality, and a paper that scored less than or equal to 5 was considered to be low quality. Through the excellent evaluation process, it was determined that 16 studies did not fulfil the criteria. these were as a result excluded from the final outcome of the quality assessment. This is based on the quality assessment criteria of Nidhra et al. (2013), in terms of QA most articles archive. The list of QA ratings of each of 31 primary studies can be found in Table 2 in the Appendix.

5. Systematic review process

The stages of the current review process described in Fig. 1. The first phase identified the keywords used in the search process. Relying on previous studies and thesaurus, keywords similar and related to research questions were used for each online database described as follows

("Online support" OR "Social Media" OR "Online Age-Friends" OR "Online Social Network" OR "Online Social Networking" OR "Online Communities" OR "Online Community" OR "Social Networking Sites" OR"social neighborhood" OR "community-based support") AND ("older adults"

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OR "elderly" OR "aging" OR "aged" OR "seniors") AND ("daily activities" OR "daily needs" OR "the activities of daily living").

As a result, the circulation of the number of primary studies in this review, as retrieved from different online databases during the systematic searching process are shown in Table 2. The study pointed out that most studies gathered before the selection process was found in Scopus (1514), followed by Web of Science (626), ScienceDirect (234), and IEEE Explore (135).

At this stage, after careful screening, 183 duplicated articles were removed. The second stage was screening. The screening stage had two round. At the first round, out of 2326 articles eligible to be reviewed, a total of 2004 articles were removed due to some inclusion and exclusion criteria. In the second round, authors screened the titles and abstracts for the (322) articles to ensure each study included older adults and their daily activities and involved online social communities. this stage produced (118) articles. The third stage is eligibility, where the full articles were accessed. After careful examination, a total of (80) articles were excluded as some did not focus on online social communities,

Online database used in SLR	Initial results
IEEE explore	135
ScienceDirect	234
Scopus	1514
Web of Science	626

were not older adults as sample study, or did not focus on the impact of online social media on older people. In the four-stage, seven (07) articles were removed due to the quality assessment criteria. The last stage of review resulted in a total of (31) articles which shaped future steps in this SLR stage.
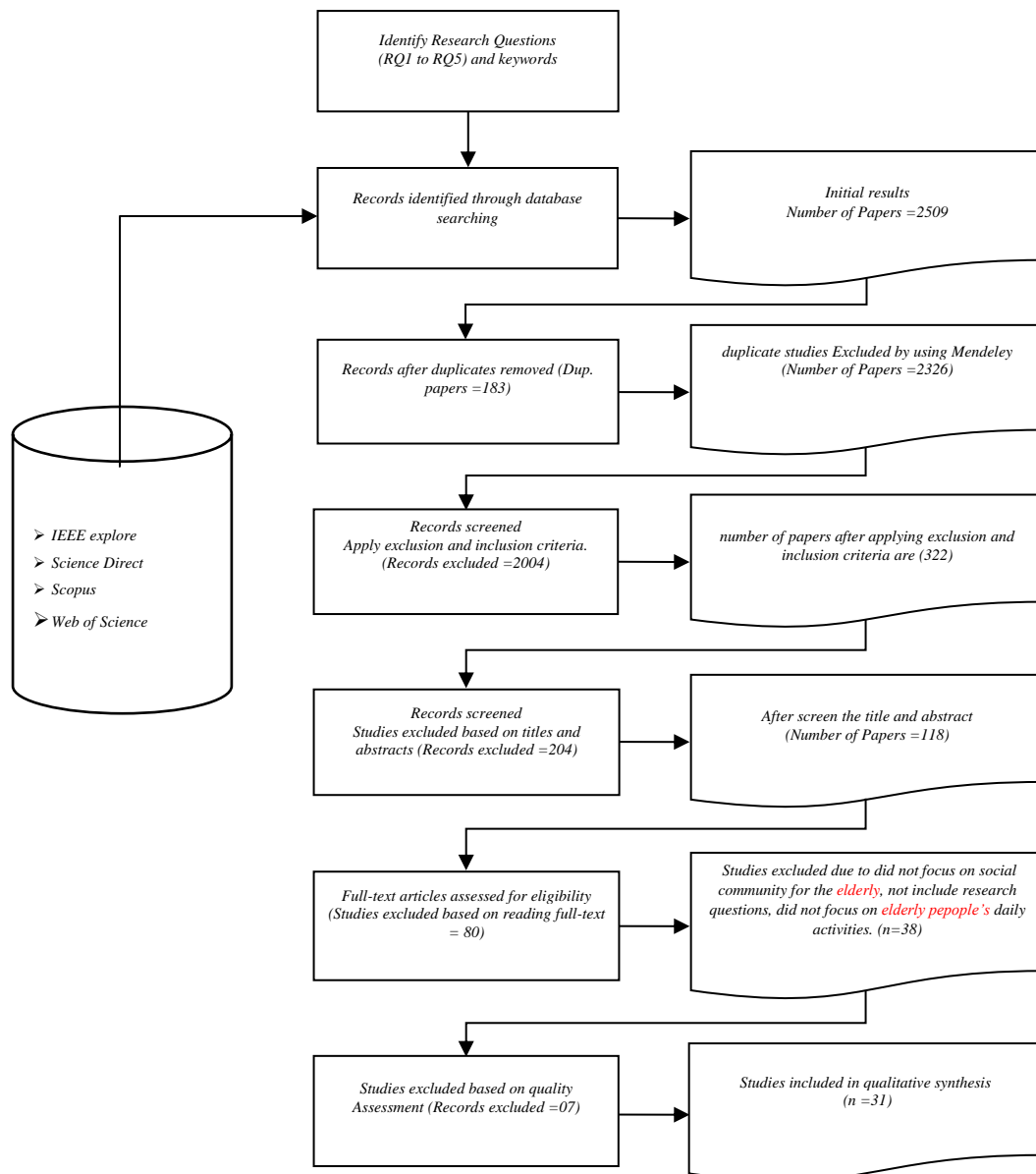
Fig. 1 Study selection process.

6. Data Extraction and Synthesis

Data extraction and synthesis are important steps following study selection in the SLR. The former occurs before synthesis for extracting results relevant to the review questions. The latter categories those results into groups to show(Munn, Tufanaru, & Aromataris, 2014; Okoli & Schabram, 2010). Data extraction form has been developed to extract the applicable information from 31 studies. Data extraction form is used to record the information gathered through the review (Budgen & Brereton, 2007). This step was conducted by scanning each study and extracting related information using Microsoft Excel spreadsheets and Mendeley. some elements were considered for this review including: Study Reference, Title Regional, Context, Topics, Methodology, Purpose, Type of paper, and Data provider as tabulated in Table 4.

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Table 4: Data Extraction Form

Ref	Study Title	Regional	Context	Topics	Methodology	Purpose	Type of paper	Data provider
(Bilbao et al., 2016)	Promotion of active ageing combining sensor and social network data	Europe	Business	Platform	Mixed method	Improve the quality of life	Journal	Scopce
(Boll & Brune, 2016)	Online support for the elderly - why service and social network platforms should be integrated	Europe	Education	User behaviour	Conceptual	Interactive communication	Journal	Since direct
(Bühler et al., 2016)	BRELOMATE - A Distributed, Multi-device Platform for Online Information, Communication and Gaming Services Among the Elderly	Europe	Business	Platform	Qualitative	Interactive communication	Chapter book	Scopce
(Castilla et al., 2018)	Teaching digital literacy skills to the elderly using a social network with linear navigation: A case study in a rural area	Europe	Educational	User Behaviour	Mixed	Interactive communication	Journal	Since Direct
(Chatterjee & acharya, 2017)	Proper use of web technology to teach older people: a case study	Asia pacific	Educational	User behaviour	Qualitative	Interactive communication	Workshop	Ieee Xplore
(Coelho et al., 2017)	"You, me & TV" — Fighting social isolation of older adults with Facebook, TV and multimodality	Europe	Educational	Tools	Mixed method	Interactive communication	Journal	Scopce
(Gusev et al., 2015)	Mindgym strategies for elderly people	Europe	Business	Platform	Mixed method	Improve the quality of life	Conference	Scopce

(Gusev et al., 2017)	Stimulating intellectual activity with adaptive environment (SMILE)	Europe	Medical	Platform	Qualitative	Improve the quality of life	Conference	Scopce
(Ha & Hoang, 2018)	An assistive healthcare platform for both social and service networking for engaging elderly people	Australia	Educational	Platform	Conceptual	Improve the quality of life	Journal	Scopce
(Haris et al., 2015)	The role of social media in supporting elderly quality daily life	Asia Pacific	Business	User Behaviour	Qualitative	Interactive communication	Conference	Scopce
(Kobayashi et al., 2016)	Social Media Mediation System for Elderly People: Message Exchange Learning Type Switching Method	Asia Pacific	Educational	Tools	Conceptual	Interactive communication	Journal	IEEE Xplore
(Kobayashi et al., 2017)	Social Media Intermediation Robot for Elderly People Using External Cloud-Based Services	Asia Pacific	Educational	Platforms	Quantitative	Interactive communication	Journal	Scopce
(Kor et al., 2017)	SMART-ITEM: iot-enabled smart living	Europe	Business	Platforms	Conceptual	Health care	Conference	IEEE Xplore
(Marcelino et al., 2016)	SSN: Senior social network for improving quality of life	Europe	Educational	Platform	Qualitative	Interactive communication	Journal	Scopce
(Mehdi et al., 2015)	Towards Enhancing Communication Between Caregiver Teams and Elderly Patients in Emergency Situations	Europe	Business	Platform	Qualitative	Emergency	Conference	Scopce
(Miori & Russo, 2017)	Improving life quality for the elderly through the social internet of things (siot)	Europe	Medical	Platforms	Qualitative	Monitoring	Conference	Ieee Xplore

(Moreno et al., 2015)	Icarer: AAL for the Informal Carers of the Elderly	Europe	Medical	Platform	Quantitative	Health care	Conference	Web of Science
(Narkwilai et al., 2015)	Factors influencing the Thai elderly's intention to use social network for Quality of Life: A case study LINE application	Asia Pacific	Educational	User Behaviour	Mixed method	Interactive communication	Conference	Scopce
(Neri et al., 2018)	Factors associated with perceived quality of life in older adults: ELSI-Brazil	Latin America	Medical	User Behaviour	Quantitative	Improve the quality of life	Journal	Scopce
(Ohtsuka et al., 2017)	A smartphone application for location recording and rescue request using twitter	Asia Pacific	Educational	Tools	Conceptual	Interactive communication	Conference	IEEE Xplore
(Ordonez-Ordonez et al., 2017)	Stimulating social interaction among elderly people through sporadic social networks	Europe	Health care	Platform	Qualitative	Interactive communication	Conference	Scopce
(Rylands et al., 2017)	The impact of Facebook on the quality of life of senior citizens in Cape Town	Africa	Business	User Behaviour	Quantitative	Interactive communication	Conference	Web of Science
(Schmeier et al., 2015)	Wir im Kiez: Multimodal app for mutual help among elderly neighbours	Europe	Business	Platform	Qualitative	Interactive communication	Conference	Scopce
(Sinclair & grieve, 2017)	Facebook as a source of social connectedness in older adults	Australia	Business	User behaviour	Quantitative	Interactive communication	Journal	Since direct
(Sousa et al., 2018)	A platform to support the care and assistance of community-dwelling older adults	Europe	Educational	Platform	Qualitative	Health care	Journal	Since Direct
(Sousa et al., 2018)	Understanding the value of social networks in life satisfaction of elderly people: a comparative	Europe	Business	User Behaviour	Quantitative	Interactive communication	Journal	Web of Science

	study of 16 European countries using SHARE data						
(Tsai et al., 2017)	Determinants of user acceptance of a specific social platform for older adults: An empirical examination of user interface characteristics and behavioral intention	Asia Pacific	Educational	User Behaviour	Mixed	Interactive communica tion	Journal	Web of Science
(van Boekel et al., 2017)	Older Adults' Internet Use Is Varied, Suggesting the Need for Targeted Rather Than Broadly Focused Outreach	Ameri ca	Educational	User Behaviour	Quantitativ e	Health care	Journal	Web of Science
(Wannatrong et al., 2019)	The Development of Online Community Model to Promote the Life Quality Level of the Elderly in Urban Society	Asia Pacific	Business	User Behaviour	Mixed	Improve the quality of life	Journal	Web of Science
(Willard et al., 2018)	Development and testing of an online community care platform for frail older adults in the Netherlands: A user-centred design	Europ e	Medical	Platform	Qualitative	Improve the quality of life	Journal	Scopce
(Yang et al., 2016)	Adoption of social media and the quality of life of older adults	Asia Pacific	Educational	User Behaviour	Unclear	Interactive communica tion	Conference	Web of Science

6.1. Sources of scholarly publications

Thirty-one (31) papers have been finally selected as primary studies. Those papers were published within the field of research regarding online social communities of the elderly. The aforementioned inclusion and exclusion and quality assessment criteria were applied to select these 31 studies. As shown in Fig. 2, the results were comprised of 16 journal articles, 13 conference papers, 1 book chapters, and
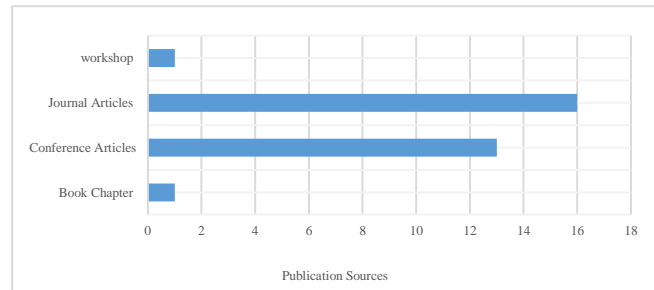

Fig2 Distribution of scholarly publication.

1 workshop. It is clear that journal articles were the most popular publication types, followed by conference articles

6.2. Scholarly publications over time

Online social communities of the elderly are an infant field of study that, in future, will be of utmost importance for the future development of communities. In this section, the authors examined the number of publications published over four years (2015-2019). Fig. 3. Illustrates that the number of publications decreases over the four years. Starting in 2015, the number of published papers was six (6), then steadily increased throughout 2016 (8 papers) and 2017 (9 papers), and finally, the number dramatically
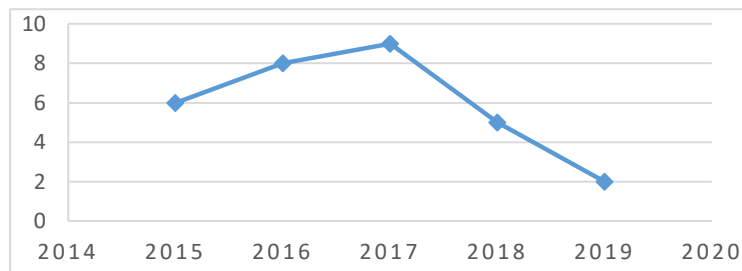

Fig.3. Publication numbers by year (2015–2019).

decreases between 2018 (5) and 2019 (2). this decline might be because of the review process was performed until June 2019.

6.3. Research Methods and Methodologies

Multiple methods (e.g. qualitative, quantitative, and conceptual) have been used in research to analyse data related to online social community platforms of older adults and its impact on their daily activities. Fig. 4 presents the distribution of the included studies over four research methodologies. It can be seen that the majority of online social community platforms of elderly studies have used quantitative methodology, and most of these studies have been survey-based. In a few studies, both qualitative and quantitative methodologies have been used together as a means of complementing each other. As shown in the Figure below, Out of a total of 31 studies, 11 used quantitative methodology,

Fig. 4. Research methods or methodologies distribution.
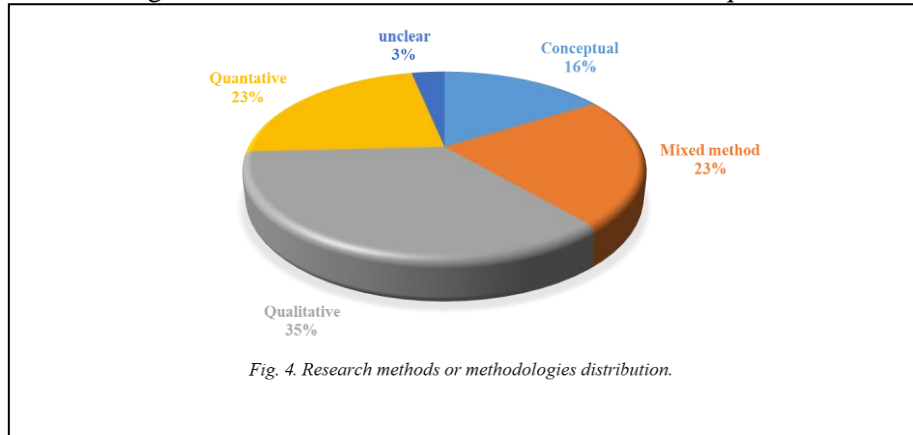
and 7 used qualitative methodology. Additionally, seven (7) used mixed methodologies, and five (5) were conceptual. The remaining 1 studies were unclear in terms of their nature.

6.4. Publication regions

In this systematic review, the publications were from six regions (Africa, America, Asia Pacific, Australia, Europe, and Latin America). As shown in Fig. 5, the Europe region contributed the greatest number of publications at 17, followed by the Asia Pacific which contributed 9, Australia which contributed 2, and then all other regions which contributed 1. This result indicates that the majority of publications were mainly from Europe and the Asia Pacific.
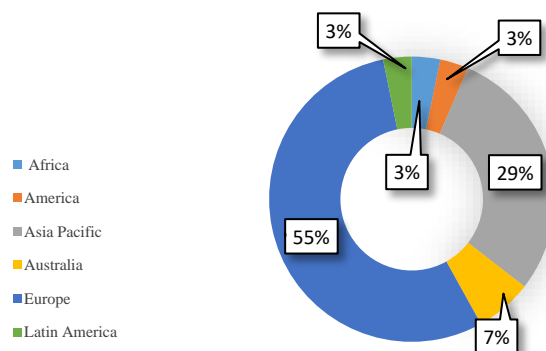

Fig. 5. Publication regions.

6.5. Research question results

This section presents and discusses the findings of this review. We start by presenting an overview of the selected studies. Secondly, we present a detailed description of the findings of this review in line with the research questions in separate sub-sections. The review results are also interpreted in this section.

RQ1: Is there a particular pattern that the current review studies can be categorized into?

Research and implementation of social media platforms for the elderly community to improve their quality of life are still in its early stages. Studying the current-existing literature in this domain would be helped to know how technology has grown. In this systematic review, based on the analysis of the systematically collected literature, the current studies were divided into 3 Category: platform, tools and user behaviour groups, the literature classified under these categories were tabulated in Table 5 in the Appendix.

The term *Platform* has many contrasting definitions and over-lapping views based on the case-scenario of existing literature. In general, a platform is a group of technologies that are used as a base upon which other applications, processes or technologies are developed. For our study, we can define *Platform* as a combination of social media and/or basic hardware like a computer or mobile phones to share user-generated content. Social media is generally defined as being "a group of Internet-based applications that are built on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content"(Kaplan & Haenlein, 2010, p. 61).

Tools are defined as a device or implement which can be held in one hand to carry out a particular function. In this review, we categorize papers which focus on instruments to interact with social media platform for the elderly as tools. Even though many inexpensive devices like mobile phones and tablets are available in the market, elderly people do not get acquainted with such advanced technological instruments with small buttons and icons. In the systematic literature analysis, some studies try to solve this problem by especially integrating social media with already available household devices like TV etc. We filter such papers and categorize them under the "Tools" Category

In the current review, the term "User Behaviour" is defined as the way in which social media and related platforms affect the behaviour of elderly people. Many studies investigate the behaviour of elders over a course of time in conjunction with the use of social media and related platforms and such literature are used bring out the result of the positive or negative effect of social media on older adults. These are categorized as "User behaviour" literature.

the current systematic literature review was carried out and in-depth analysis of 31 scientific studies was done classifying them in accordance with the above-mentioned categories. As shown in fig. 6, It can be seen that the majority of review studies are Platform, while 41.94% of studies are related to the second group *User Behaviour*. In a few studies, the third group (*Tool)* has been used among the current review literature with 9.68 %.
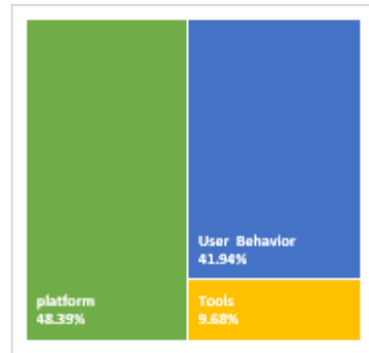
Fig. 6 studies classification beads on paper type

RQ2: Are there online social communities that are designed for helping the elderly?

To tackle the issue of loneliness and social isolation among the elderly community, many researchers have worked on social community platforms. One of these solutions is the SONOPA Project as described in Bilbao, Almeida, & López-de-Ipiña (2016) whose objective was to combine a social network with information inferred using in-home sensors. It consists of a social network and the SONOPAD connected through a middleware called the SONOPA Controller. The elders using the social networks for communication and connectivity receive a recommendation of new connections based on both their interests and activity level. This is realized through a matchmaking algorithm inbuilt in the platform which gathers data from the sensors (activity and socialization levels) and from the social network (socialization level and user profile data).

Some other platforms researched are related to social platforms integrated with household devices. One of them is the multi-device platform called BRELOMATE to promote communication among the elderly (Bühler, Penaz, & Miesenberger, 2016). The BRELOMATE platform is a distributed information, communication and gaming platform, which is facilitated through commonly available ICT in households like TV with a remote or tablets with the internet. In this platform, the elderly can receive invitations from other users to play games. Similarly, Gusev et al. (2015) described a social network integrated IPTV called MindGym. It is a concept aimed at providing recreation and social communication to elderly within their home environment with the help of easily available technologies like TV and smart remotes. In this study "You, me & TV" — Fighting social isolation of older adults with Facebook, TV and multimodality Gusev, Patel, & Tasic (2017) presented a television-based multimodal Facebook prototype is developed for ease-of-use of elderly. In this platform and tools, a new feature for sharing printed photos, and multiple interaction modalities like remote control, voice and gestures are also provided for the aged people. Similarly, stimulating intellectual activity with the adaptive environment (SMILE) is a social network on IPTV, along with health self-care. The SMILE concept is based on combining the traditional IPTV services with cutting-edge technologies like social networks and cloud computing which makes use of activity recognition sensors like cameras and microphones to detect presence and activity of elders for personalised therapies and activity recommendation (Gusev et al., 2017).

Social media intermediation with robots for the elderly is also present in the current review studies by Kobayashi, Katsuragi, Miyazaki, & Arai (2017). They disclose a robot for the elderly to have

interactive communication with the younger generation via existing social media. Since a lot of elderly find it difficult to use a smartphone to access social media, the proposed human-type robot system equipped with a microphone, camera, speaker, sensors can be used by elders to communicate to & fro by voice through social media.

One of the majorly focused topics in this field is integrating social media with health monitoring sensors for regular medical recommendation to elders. Kor, Yanovsky, Pattinson, & Kharchenko (2017) in their review "SMART-ITEM: IoT-enabled smart living" mentions an integrated open-sourced IoT ecosystem to provide a one-stop-shop for older people. The elder's vital data and activity data are gathered which are further sent to caregiver to provide recommendations related to health. In the same manner, Miori & Russo, 2017; Moreno et al. (2015) both presented the elderly monitoring systems with home sensors to send data to carers. An autonomous mobile robot (ARTOS) which is used for communication in the home environment during an emergency by the Emergency Responding Teams (ERT) was provided by Mehdi, Avtandilov, Humayoun, & Berns, (2015).

A lot of literature also is focused on improving the ease-of-use of the social media platform for the elderly. The paper "Social Media Mediation System for Elderly People: Message Exchange Learning Type Switching Method", Kobayashi et al. (2016) mentioned a social media platform with a machine learning algorithm that performs automatic message destination address finding and message sending based on the message content of elderly people. Modifying or creating a user-centred social media platform which is based on the elderly users interviewed opinions of ease-of-use, find a solution for the elderly to easily share their current location in case of emergency through social media to other family and friends (Sousa et al., 2018; Willard et al., 2018).

Some literature is based on social media platforms which use elderly people's voice for using social media for social interaction. "SSN: Senior social network for improving quality of life" Marcelino, Laza, & Pereira (2016) built a web application with speech recognition. In this system, YouTube is used as the platform which uses audio translated to command to make a video phone call or to create, watch, and upload videos. Similarly, Wir im Kiez: Multimodal app for mutual help among elderly neighbours Schmeier, Russ, & Reithinger (2015) provided a multimodal social network app, in which a user may talk to the system in the way the user wants to and hence no commands need to be learned or recognized.

Social Media with integrated with social service platform is also one of the least focused areas in the review literature related to platforms and tools. Ha & Hoang (2018) proposed a model in their paper "An assistive healthcare platform for both social and service networking for engaging elderly people" which promotes active ageing of elderly people through online/offline interaction. It makes use of an online web platform, which can be used by young users to request services by setting up meeting offline to deliver the service. A smart application for elders to promote recreational and cultural activities, depending on their interest provided in their profile was studied. The users are recommended events by the system based on their interests. Ordonez-Ordonez et al. (2017) mentioned a multimodal app for mutual help among elderly which brings people in the neighbourhood together to help each other in daily activities. The current review which implemented online social platforms as the main topic described in Table 6 in the Appendix.

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RQ3: To what extent the existing online social communities provide the appropriate assistance to the elderly?

The elderly community easily feel socially isolated and many of the researchers in this field trying to decrease the psychological decline of the elderly due to loneliness has emphasized on the importance of online social network sites. Some researchers have even found that brain activity increases with interactive communication through the internet (Small et al., 2009). Social networks are basically a group of Internet-based applications which allow users to interact and share content with each other. Some authors have used the term 'social media' interchangeably with Web 2.0 as well (Berthon, Pitt, Plangger, & Shapiro, 2012). Most online social networks like Facebook, Twitter, and LinkedIn have the feature to create user profile pages which basic information like name, sex, age, location and a list of hobbies and favourite in movies and books etc. Currently, these social networks foster online relationships between offline friends and family such as users use social media as a platform to stay connected with people they already know who might be in the other part of the world. In addition to this, studies have also found that social networking can have positive effects on the elderly in terms of communication. It also further provides the option of finding new people and making new friends on the basis of shared interests.

Currently, much literature focuses on interaction through social media for the elderly and literature study the impact of social on older adults. "The role of social media in supporting elderly quality daily life" Haris, Majid, Abdullah, & Osman, (2015) studied how social media can support elderly deal with their everyday routine life using Netnography method and 'The impact of Facebook on the quality of life of senior citizens in Cape Town" Rylands et al. (2017) investigated the impact that the use of Facebook has on the quality of life (QOL) of older adults using the positivist approach. It utilised a conceptual model comprised of parts of Kleine's Choice Framework and CASP-19. Results showed that respondents used Facebook primarily to stay socially engaged with their friends and family which adds happiness to their lives and ultimately translates to an improved quality of life.Sinclair & Grieve (2017) examined the extent of social connectedness in elder's with Facebook. A comparative study by Tomini, Tomini, & Groot (2016) who studied the effect of a large number of family and friends network with the proportion of friends over the total number of persons in using the social network on life satisfaction among older adults. "The Development of Online Community Model to Promote the Life Quality Level of the Elderly in Urban Society"Wannatrong, Yoannok, & Srisuk (2019) who analysed what elders want to do with social media and implement it through web application for promoting quality of life, whereas van Boekel, Peek, & Luijkx (2017) aimed to investigate the amount and variation in Internet use among elder to test its relationship to social and health factors.

Many of the studies investing the extent of social media on elder also get under the niche to find what the factors that influence elder's quality of life and factors that enable elders to use social media. Neri et al. (2018) investigated the perceived quality of life in elders using CASP-19 scale. Age, schooling, mobility, sociability and instrumental and emotional support are associated with perceived quality of life. In "Factors influencing the Thai elderly's intention to use social network for Quality of Life: A case study LINE application"Narkwilai, Funilkul, & Supasitthimethee (2015) explored the factors that influence the elderly's intention to use a social media application for Quality of Life. The study integrates the Unified Theory of Acceptance and Use of Technology (UTAUT). The results indicated that the factor most associated with behavioural intention to use the social media application in the elderly for quality of life was Performance Expectancy and Effort Expectancy. Tsai, Chang, Chen, & Chang (2017) interpreted how user interface design affects older people's intention and attitude related to using social network systems. Also, Yang, Yuan, Archer, & Ryan (2016) discussed how social

media can be used by older adults to enhance their quality of life (the factors that may affect the adoption of social media by older adults).

Apart from these, "Teaching digital literacy skills to the elderly using a social network with linear navigation: A case study in a rural area" tested a social network with elders in rural areas and positive results were obtained on the variables measured, i.e., learnability, sense of control over the system, ability to use the system, orientation, efficiency, accessible design, perceived ease, perceived usefulness, and intention to use (Castilla et al., 2018). Similarly, (Chatterjee & Acharya, 2017) in their study taught elderly people in rural areas to use IRCTC website and Facebook.

RQ4: Do existing online social communities have a significant impact on the elderly's daily activities as well as improve their quality of life?

The different purposes addressed by the reviewed literature are monitoring, interactive communication, improving quality of life, health care and emergency.

Monitoring:

Monitoring basically means the observation and progression checking of a parameter over a period of time. In elders, keeping an eye on their health parameter would greatly help caregivers and doctors in providing timely healthcare to them. But many senior adults prefer living in their own homes as long as possible to have a normal and independent life, and so they do not keep a proper tab on their health parameter until things get severe. Hence, home-based sensors are studied for the purpose of monitoring the healthcare parameters in elders. In the reviewed literature, Chatterjee & Acharya (2017) study focused on the elderly monitoring to gathering their data for medical purpose.

Interactive Communication:

Interaction communication is very important in elders, as studies have found evidence that frequent interaction of elders with other people can improve their health by reducing dementia and cognitive impairment (Quinn, 2018). Many of the reviewed literature focus on the purpose of improving interactive communication for elders. Since elders are usually homebound or live alone, social networks are taken as the main aspect of exploring interactive communication among elders.

In the reviewed literature related to interactive communication, some paper relates to developing platforms with social networks which are specially designed for elders for easy interaction through a household device like TV and Tablets or robotic medium. (Bühler et al., 2016) BRELOMATE platform, (Coelho, Rito, & Duarte, 2017) television-based multimodal Facebook prototype and (Kobayashi et al. 2017) social media intermediation robot for the elderly to have an interactive communication are such related papers. Another topic that is covered by the literature related to interactive communication is focusing on improving the ease-of-use of the social media platform for better interactive communication. Kobayashi et al. (2016) provided an automatic message destination address finding algorithm improved in the social media platform based on the message content of elderly people. Ohtsuka, Ishii, Utsu, & Uchida, (2017) improved the platform by sharing the elderly's location in case of emergency through twitter.

Interactive communication is focused on for elderly people in the reviewed literature by using prompts instead of text, as presented in (Marcelino et al., 2016) "SSN: Senior social network for

improving quality of life" and (Schmeier et al., 2015) "Wir im Kiez: Multimodal app for mutual help among elderly neighbours".

Some literature studies also focus on improving social media interactive communication for the people elderly by first connecting online and then eventually meeting offline. These are presented in papers "Stimulating social interaction among elderly people through sporadic social networks" (Ordonez-Ordonez et al., 2017) and (Schmeier et al., 2015). Studying the impact of social media on the elders as a focus of interactive communication is also provided in many papers, namely "The impact of Facebook on the quality of life of senior citizens in Cape Town"(Rylands et al., 2017) where the impact of Facebook on the Quality of Life of senior citizens is studied by , and also in the papers of (Narkwilai et al., 2015; Sinclair & Grieve, 2017; Tomini et al., 2016). Determining the factors of social media and the quality of life on older adults is also targeted in (Tsai et al., 2017) "Understanding the value of social networks in life satisfaction of elderly people: a comparative study" and "Adoption of social media and the quality of life of older adults"(Yang et al., 2016) .

Healthcare:

The organized provision of medical care to an individual or a community is typically healthcare. Some of the reviewed literature also focuses on the aspect of providing healthcare to elders in a simple way through web platforms or social networks. In the paper "A platform to support the care and assistance of community-dwelling older adults" Sousa et al. (2018) presented the SOCIAL project which to provide information core services to support the care and assistance of community-dwelling older adults through the SOCIAL platform. Different types of interacting entities like public & private health care institutions, transport providers, assistance providers etc. are included in the platform. Another paper "iCarer: AAL for the Informal Carers of the Elderly" Moreno et al. (2015) introduced the iCarer project which can support informal carers of elderly people by intelligent and interactive monitoring of daily activities of the elders and calculating behavioural patterns. "SMART-ITEM: IoT-enabled smart living" Kor et al. (2017) focused on elder's vital data and activity data with a range of complex algorithms to provide recommendations related to health. van Boekel et al. (2017) mainly aimed to investigate the amount and the Internet in relation to elder's social and health factors.

Emergency:

One of the reviewed studies is also addressed toward emergency in case of elderly persons. The paper "Towards Enhancing Communication Between Caregiver Teams and Elderly Patients in Emergency Situations"Mehdi et al. (2015) presented a framework which is developed especially for emergency. The framework uses an autonomous mobile robot (ARTOS) which is a human-like robot capable of driving autonomously in the home environment and detects obstacles apart from learning the daily routine of the elderly person. In case of emergency when the emergency situation is reported to the Health Service Center (HSC), the Emergency Response Team (ERT) can take access of the robot and communicate with the person or navigate it in the home environment to understand the situation.

Improve Quality of Life:

QOL has been defined as an "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" by WHO. But in our study, we perceive "Quality of Life" as maintaining the psychological aspect of elders with active ageing in terms of social and cultural interaction. In the literature review,

many paper's basis is towards improving elder's quality of life. The SONOPA Project Bilbao et al., (2016) aimed in using in-home sensors with social media to provide recommendations to elders for improved quality of life. MindGym strategies for the elderly, Gusev et al. (2015) described a social network integrated IPTV for the same purpose. SMILE platform (Gusev et al., 2017) is a social network on IPTV as well which uses activity recognition sensors to send reminders therapies and activities along with social communication to the elder to take care of their personal health as well along with social health. Also, Ha & Hoang (2018) provided a healthcare platform for engaging the elderly. These presented platforms actively engage the elderly in social interaction and/or offline interaction which ultimately improves their quality of life.

Some other papers study the impact of social platforms on elderly lifestyle to understood and implement them for future modifications of social media for elder as in "Factors associated with perceived quality of life in older adults: ELSI-Brazil"(Ha & Hoang, 2018), that studies older adults factors of QOL. Apart from these (Wannatrong et al., 2019) "The Development of Online Community Model to Promote the Life Quality Level of the Elderly in Urban Society" and (Willard et al., 2018)" Development and testing of an online community care platform for frail older adults in the Netherlands: A user-centred design", both study the user behaviour of elders in association with social platforms and their effect on their Quality of Life.

RQ5: What are limitations and gaps within current review studies about online social communities of the elderly and their effect on the elderly's daily activities?

The reviewed literature helps us researchers understand in large the different tracks in which the current state-of-the-art has been focused within the theme of online social communities and their impact on older adults. Most of the literature papers focused on the following concepts: 1) On building or developing a social media for the elders to increase social interaction and communication, which are heavily centered on ease-of user interface for the elders 1) On integrating social network with easily available household devices like TV with remote or Touch-screen Tablets to enable easy usage of social media by elders 3) On voice-to-command system for social media 4) Social media integrated with health monitoring sensors for regular medical recommendation to elders 5) Understanding the impact of social media on elders.

Even though most of the concepts covered by the reviewed papers are quite useful for the elders and are paving a path towards realistic and beneficial system for elders to improve social interaction, many presented improvements still have their limitations. In the paper "Social Media Intermediation Robot for Elderly People Using External Cloud-Based Services" (Kobayashi et al., 2017), a human interaction-type user interface is enabled for the elderly with a robot to have communication just like talking with a receptionist, but the recording of the voice, processing and uploading in all take at least a maximum of 10 seconds of the user. This may seem less but in the long run, users might get fed up using such slow response systems for regular interaction. Apart from such limitation, a major limitation that was identified in this domain is that hardly any paper focuses on improving the physical activity life of an elder. The concept of social media integrated with advanced social service system is still lagging behind. Some papers do focus on this topic, especially (Bilbao et al., 2016; Boll & Brune, 2016; Ordonez-Ordonez et al., 2017) who provided a recommendation of new social connections through social media who can set up further meet with the people offline. But there are still limitations in terms of providing a safer offline interaction within their locality and improving the physical activity life of the elders further.

Discussion and Conclusions

In this paper, we do an intensive systematic literature review on the online social community for older adults and their impact on daily lives. We also provide an overview of social media and its generic relationship for older adult's psychological well-being as discussed by studied by different researchers. After executing a number of steps within the systematic process, 31 studies were selected for further data analysis process. Through the literature, the current state-of-the-art of the domain came clearly into focus related social media, social media's effect on older adults, newly developed platform integrated with social media for elders and more. It was identified from the literature that the papers could be classified under three main research topics/themes, namely, platforms, tools and user behaviour. The large majority of the papers were related to platforms followed by user behaviour and tools.

The purpose addressed by the literature included monitoring, interactive communication, improving quality of life, health care and emergency. Apart from this, the study results indicated that the study approach of the papers involved quantitative methodology in the maximum papers followed by qualitative methodology. Additionally, mixed methodologies and conceptual concept were also used.

Furthermore, a lot of studies focus precisely on building effective social media systems for the elderly as it has a positive effect on their cognitive system. As many elderly find it difficult to work with such advanced technologies, authors have tried to implement social media with inexpensive household devices like TV and tablet. Studies have also tried in implementing voice to command systems for the social media, for elders as they believe a voice-command system would remove the hassle for elders in learning new technologies. Theories such as the Technology Acceptance Model (TAM) have been also used to study the impact and use of social media elders. Apart from this, the research's gaps and limitations based on the reviewed literature is discussed in this paper. This, this paper provides insight into the current state-of-the-art technology and is expected to be of support to researchers in understanding the state of social media and related platforms of older adults.

The reviewed literature has some limitations as the literature papers used for the review are those papers that were published in the period from 2015 to 2019. Hence, it opens up the possibility of further research as well in terms of understanding the domain before 2015. Since social media and platforms are still at an early stage, and further research will continue to progress. From this systematic review literature, we have analysed the papers and concluded the grey area in the domain, as it not possible to find the same through database search alone. With the information found in this review, researchers can get an in-depth knowledge of the current research position and a good basis for further research in this area.

Appendix

Table 2: The quality assessment scores of each selected studies.

ID	QA1	QA2	QA3	QA4	QA5	Total Score
(Bilbao et al., 2016)	2	2	2	2	2	10
(Boll & brune, 2016)	2	2	2	1	1	8
(Bühler et al., 2016)	2	1	0	2	2	7
(Castilla et al., 2018)	2	0	0	2	2	6
(Chatterjee & acharya, 2017)	2	0	0	2	2	6
(Coelho et al., 2017)	2	0	0	1	2	5
(Gusev et al., 2015)	2	0	0	2	1	5
(Gusev et al., 2017)	2	0	0	1	2	5
(Ha & hoang, 2018)	2	2	2	2	2	10
(Haris et al., 2015)	2	0	0	2	1	5
(Kobayashi et al., 2016)	2	0	0	2	2	6
(Kobayashi et al., 2017)	2	0	0	2	2	6
(Kor et al., 2017)	2	0	0	2	1	5
(Marcelino et al., 2016)	2	1	0	2	2	7
(Mehdi et al., 2015)	1	0	0	2	2	5
(Miori & russo, 2017)	1	0	0	2	2	5
(Moreno et al., 2015)	2	0	0	1	2	5
(Narkwilai et al., 2015)	2	0	0	2	2	6
(Neri et al., 2018)	1	0	0	2	2	5
(Ohtsuka et al., 2017)	2	1	0	2	2	7
(Ordonez-Ordonez et al., 2017)	2	2	2	2	2	10
(Rylands et al., 2017)	2	1	1	2	2	8
(Schmeier et al., 2015)	2	2	2	1	2	9
(Sinclair & grieve, 2017)	2	2	1	2	2	9
(Sousa et al., 2018)	2	2	2	1	2	9
(Sousa et al., 2018)	2	1	1	2	2	8
(Tsai et al., 2017)	2	1	0	2	2	7
(van Boekel et al., 2017)	2	1	0	2	2	7
(Wannatrong et al., 2019)	2	2	1	2	2	9
(Willard et al., 2018)	2	1	1	2	2	8
(Yang et al., 2016)	2	0	0	2	2	6

Table 5: The studies that are classified under Platform, Tools, and User Behaviour Categories.

Topics	Description	References
platform	a collection of internet based applications which are constructed at the ideological and technological foundations of web 2.0 and that permit the creation and exchange of user-generated content	(Gusev et al., 2015),(Mehdi, Avtandilov, Humayoun, & Berns, 2015),(Schmeier, Russ, & Reithinger, 2015), (van Boekel, Peek, & Luijkx, 2017),(Bilbao, Almeida, & López-de-Ipiña, 2016),(Bühler, Penaz, & Miesenberger, 2016),(Marcelino, Laza, & Pereira, 2016),(Gusev, Patel, & Tasic, 2017),(Ordonez-Ordonez et al., 2017),(Ha & Hoang, 2018),(Sousa et al., 2018),(Willard et al., 2018),(Kobayashi, Katsuragi, Miyazaki, & Arai, 2017),(Kor, Yanovsky, Pattinson, & Kharchenko, 2017), (Miori & Russo, 2017)
Tools	a device or implement which can be held in one hand to carry out a particular function. In this review, we categorize papers which focus on instruments to interact with social media platform for the elderly as tools	(Kobayashi et al., 2016),(Coelho, Rito, & Duarte, 2017), (Ohtsuka, Ishii, Utsu, & Uchida, 2017)
User Behaviour	user behaviour is defined as the way in which social media and related platforms affect the behaviour of elderly people	(Tsai, Chang, Chen, & Chang, 2017), (Narkwilai, Funilkul, & Supasitthimethee, 2015), (Haris, Majid, Abdullah, & Osman, 2015),(Chatterjee & Acharya, 2016),(Boll & Brune, 2016),(Tomini, Tomini, & Groot, 2016) (Tomini et al., 2016), (Sinclair & Grieve, 2017), (Rylands et al., 2017),(Neri et al., 2018),(Castilla et al., 2018), (Moreno et al., 2015),(Wannatrong, Yoannok, & Srisuk, 2019)

Table 6: The online social community platforms in current reviews

Reference	Social community type
(Bilbao et al., 2016)	A tablet which provides a user interface for data visualization and recommendations, and the social network, where the elder will receive recommendations of new social connections.
(Boll & brune, 2016)	Integrated online service and social network
(Bühler et al., 2016)	Multi-device platform uses TV and tablet as a second screen control interface
(Coelho et al., 2017)	Using tv as a platform for deploying access to facebook
(Gusev et al., 2015)	IPTV system (TV, tablets and remote devices as technology to access the content with additional plugins such as self-health care system.
(Gusev et al., 2017)	Interactive TV, social networking, and software as a service (SAAS) cloud solutions
(Ha & Hoang, 2018)	Web technology
(Kobayashi et al., 2016)	Hardware interface (report) uses existing social media
(Kobayashi et al., 2017)	A robot that elderly people can retrieve and transmit information by voice via social media without using smartphones.
(Kor et al., 2017)	Apps and web access.
(Marcelino et al., 2016)	The platform is tailor-made for older people and can be used on a computer, smartphone, or tablet pc.
(Mehdi et al., 2015)	Robot as a communication medium which controls through mobile devices
(Miori & Russo, 2017)	Hardware (monitoring devices) and social networking
(Moreno et al., 2015)	The carer project (hardware, web and mobile applications)
(Ohtsuka et al., 2017)	The android app uses twitter
(Ordonez-ordonez et al., 2017)	This app is part of the safer platform application for mobile devices
(Schmeier et al., 2015)	A multimodal social network app (mobile app)
(Sousa et al., 2018)	Web and mobile applications
(Willard et al., 2018)	Interactive software concept installed on a standard pc,

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