# Integrative Medicine Research

**Original Article**

# Self-care use patterns in the UK, US, Australia, and Japan: a multinational web-based survey

CrossMark

**Sujeong Mun, Jeong-Hwan Park, Seung-Min Baek, Minhee Lee, Sun-Mi Choi, Sanghun Lee***

*Acupuncture, Moxibustion, Meridian Research Group, Korea Institute of Oriental Medicine, Yuseong-gu, Daejeon, Korea*

ARTICLE INFO

ABSTRACT

*Background:* The trend toward patient- or consumer-centered healthcare has been accelerated by advances in technology, consumer empowerment, and a shift from infectious to chronic diseases. The purpose of this study was to examine the growing self-care market by analyzing self-care patterns.

*Methods:* We conducted a cross-sectional, web-based survey involving adults from nine major cities in the UK, the USA, Australia, and Japan. This study examined the extent and frequency of self-care, self-care expenditure, sources of self-care information, and reasons for self-care in each country.

*Results:* The results showed that the prevalence of self-care was highest in Japan (54.9%), followed by the UK (43.1%), the USA (42.5%), and Australia (40.4%). The primary reason for practicing self-care was "to manage my healthcare myself" (cited by 45.7%, 59.5%, 49.2%, and 4.1% of participants in Australia, Japan, the UK, and the USA, respectively). Significant linear associations were observed between age and the prevalence of self-care in all countries ($p < 0.05$), indicating that self-care prevalence decreased with age in the UK, the USA, and Australia, and increased with age in Japan. The frequency with which self-care was practiced was positively correlated with age in the USA ($p < 0.05$), Australia ($p < 0.01$), and Japan ($p < 0.05$). In addition to acquaintances, internet search engines and information obtained from pharmacies were considered reliable and widely used sources of self-care information.

*Conclusion:* When developing self-care products or services, healthcare providers and policymakers should consider self-care patterns.

© 2016 Korea Institute of Oriental Medicine. Published by Elsevier. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

## 1. Introduction

The global pattern of disease burden has shifted from infectious to chronic diseases, resulting in changes in patient needs from short-term cures to long-term care and leading to a transition in healthcare settings from hospital to home or work. Additionally, technological developments have provided sophisticated, convenient devices that enable individuals to manage their own health and diseases. Because of the wide

availability of the internet, laypeople are increasingly well informed and involved in decision-making regarding their own healthcare.[1,2]

Reflecting the trend toward patient- or consumer-centered healthcare, the value of the global self-care medical device market is expected to grow at a rate of 7.0% between 2013 and 2019 and reach United States dollars (USD) 16.8 billion by 2019.[3] Many governments, including those of the USA, European countries, and Australia, have shown increasing interest in supporting self-management, because of the advantages of practicing self-care in long-term health management and the related decrease in healthcare costs for minor ailments.[4–6]

Relationships between self-care patterns and socioeconomic and disease characteristics have been examined in previous studies,[7–9] but surveys comparing more than one country are scarce.[10] However, to our knowledge, no previous studies have assessed self-care patterns in individuals actively engaged in self-care, who are most likely to practice self-care in the future.

The definition of self-care in previous studies varied from that of a broad range of activities undertaken by laypeople as part of their health management[9] to that of specific self-care activities practiced without doctor involvement,[10] often only when experiencing symptoms.[11] To assess the self-care market, we defined self-care as the practice of self-determined home healthcare activities using appropriate products. Self-care was considered a means of health improvement practiced by consumers according to preference and without guidance from healthcare professionals.

The purpose of the study was to examine the characteristics of self-care markets in the UK, the USA, Australia, and Japan, to prepare for the development of self-care products and activities. We analyzed self-care patterns, which included self-care expenditure, the extent of self-care, self-care frequency, reasons for self-care, and sources of self-care information, in individuals actively engaged in self-care.

## 2. Methods

### 2.1. Sample

We conducted an online survey of adults aged between 25 years and 59 years, as this age group is considered economically active and independent. Participants were resident in the two most populous cities in the UK, the USA, Australia, and Japan. When the two most populous cities in a country were close to each other, the most populous city located at a distance from the first two cities was selected to ensure that data collection reflected various geographical locations. In Australia, the populations of Sydney and Melbourne are similar, and both are located in Southeast Australia; therefore, Perth (4th in population size) was also included to allow data collection in Western Australia. Aside from these three Australian cities, the study included New York and Los Angeles in the USA, London and Birmingham in the UK, and Tokyo and Osaka in Japan. Prior to administering the survey, we conducted a pilot study in Northern Ireland and observed issues, such as participation rates, self-care prevalence, and average interview duration.
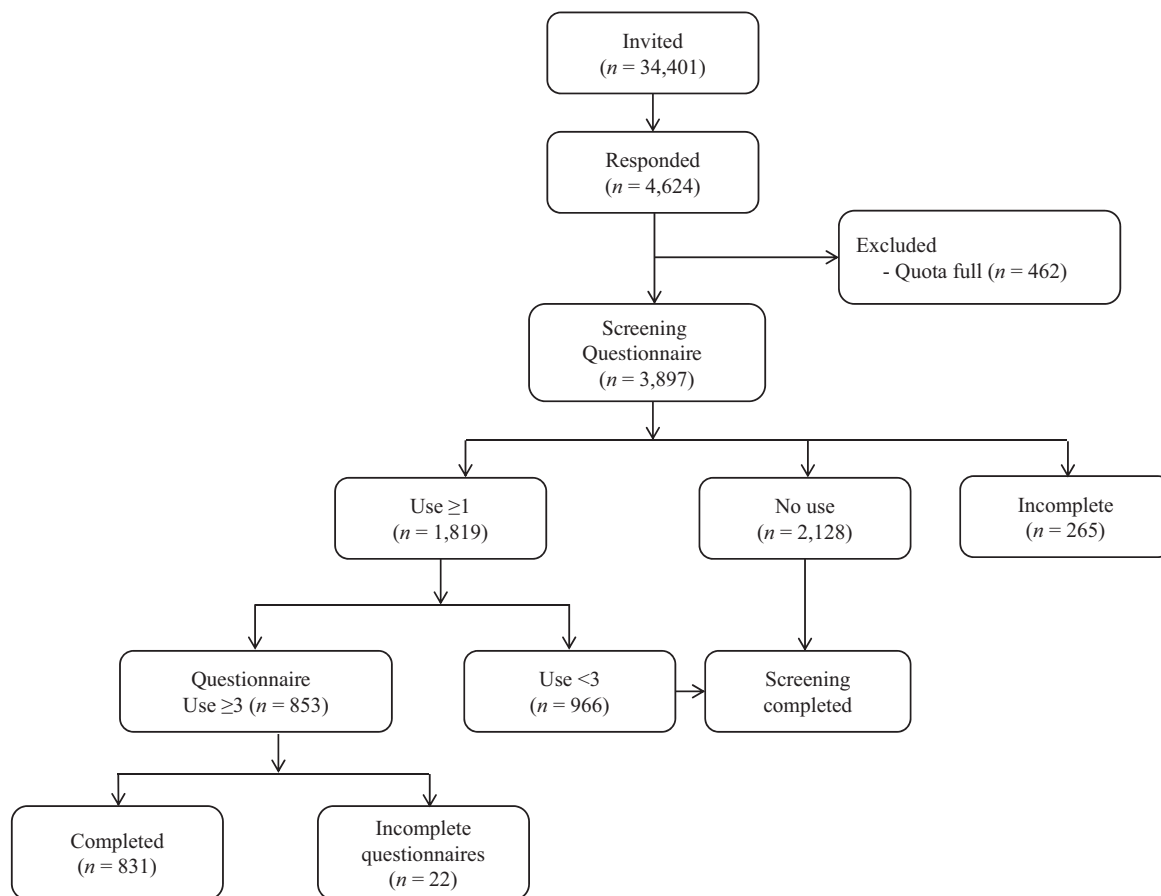
The survey was conducted between September 2012 and October 2012. We recruited respondents via an internet panel maintained by Global Market Insite (http://www.marketingresearch.org/issues-policies/glossary/gmi-global-marketing-insite-inc), which provided global online samples for market research. The panel was made up of millions of panelists from around the world who had, upon enrollment as panel members, agreed to participate in online surveys. E-mail invitations were sent to the panelists, who were randomly chosen from each age and sex group to ensure that the age and sex of the respondents reflected that of the general population of each city. Invitation reminders were sent to encourage survey participation. E-mail contact and questionnaire administration were facilitated by an impartial third party acting as an honest broker. The third party had access to an international internet panel, conducted the web-based survey, and subsequently provided the research team with anonymous survey results. Therefore, the research team did not have access to any information that could be used to identify the respondents. The study was conducted in accordance with the ethical principles described in the Declaration of Helsinki.

Recruitment continued until the number of respondents who practiced at least three types of self-care reached at least 200 in each country. In total, 34,401 individuals were invited to participate in the survey; of these, 3,897 (11.3%) completed the screening questions. Because we intended to examine self-care patterns in consumers who were considered most likely to purchase self-care products, we defined individuals who practiced at least three types of self-care ($\geq$ 3 self-care types) as "actively engaged in self-care." Of those who completed the screening questions, 853 (21.9%) practiced at least three types of self-care and proceeded to the subsequent questionnaire section. Ultimately, 831 (21.3%) individuals completed the entire questionnaire (Fig. 1 and Table 1).

### 2.2. Survey instrument

The first questionnaire section consisted of screening questions used to assess demographic characteristics, the extent of self-care, and reasons for practicing self-care. Of the screened respondents, those who were actively engaged in self-care proceeded to the subsequent section, which was used to assess self-care expenditure and frequency, the purpose and effectiveness of self-care, and sources of self-care information. The final section assessed respondent perceptions and experiences of traditional East Asian medicine and recorded their intention to purchase self-care products based on traditional East Asian medicine. Responses to the final section of the questionnaire are not reported herein and will be incorporated into a different manuscript that is currently undergoing preparation for publication.

"Self-decided home healthcare products/activities" was used to clarify the meaning of self-care and was further defined as follows: (1) practiced by consumers to improve health/wellness, according to personal preference; (2) practiced without recommendation by a healthcare professional or prescription; (3) involved proactive investment; and (4) suitable for self-application at home. The questionnaire was

Invited
(*n* = 34,401)

Responded
(*n* = 4,624)

Excluded
 - Quota full (*n* = 462)

Screening
Questionnaire
(*n* = 3,897)

Use ≥1
(*n* = 1,819)

No use
(*n* = 2,128)

Incomplete
(*n* = 265)

Questionnaire
Use ≥3 (*n* = 853)

Use <3
(*n* = 966)

Screening
completed

Completed
(*n* = 831)

Incomplete
questionnaires
(*n* = 22)

**Fig. 1 – Respondent recruitment flow.**

developed in English and translated into Japanese for use in Japan.

### 2.3. Data analysis

A Chi-square test with Bonferroni correction for multiple testing was performed to compare self-care prevalence between countries. An analysis of variance was performed, with Scheffé's post hoc test, to compare the numbers of self-care products and activities used between countries. The linear-by-linear association test was used to assess the linear association between age group and self-care prevalence. Pearson's correlation analysis was performed to examine the relationship between age and the proportion of income allocated to self-care expenditure. Multiple regression analysis was used to determine whether age was related to self-care expenditure after controlling for income. The frequency with which self-care was practiced was measured as an

| Table 1 – Screened respondent demographic characteristics | | | | |
|---|---|---|---|---|
| | Australia (*n* = 944) | Japan (*n* = 1,439) | UK (*n* = 798) | USA (*n* = 716) |
| Sex | | | | |
| Male | 438 (46.4) | 728 (50.6) | 397 (49.7) | 343 (47.9) |
| Female | 506 (53.6) | 711 (49.4) | 401 (50.3) | 373 (52.1) |
| Age group (y) | | | | |
| 25–29 | 215 (22.8) | 182 (12.6) | 148 (18.5) | 111 (15.5) |
| 30–34 | 195 (20.7) | 217 (15.1) | 139 (17.4) | 113 (15.8) |
| 35–39 | 143 (15.1) | 265 (18.4) | 124 (15.5) | 105 (14.7) |
| 40–44 | 119 (12.6) | 235 (16.3) | 112 (14.0) | 105 (14.7) |
| 45–49 | 98 (10.4) | 208 (14.5) | 111 (13.9) | 105 (14.7) |
| 50–54 | 85 (9.0) | 173 (12.0) | 91 (11.4) | 94 (13.1) |
| 55–59 | 89 (9.4) | 159 (11.0) | 73 (9.1) | 83 (11.6) |
| Data are presented as *n* (%). | | | | |

ordinal variable, and Spearman's rank-correlation analysis was performed to examine the relationship between age and maximum frequency for each respondent.

Responses obtained from the 3897 respondents who answered the screening questions were used to determine self-care prevalence, reasons for practicing self-care, and the relationship between age and self-care prevalence. Responses from the 831 respondents who practiced at least three types of self-care and completed the entire questionnaire were included in the analysis of the relationships between age, self-care expenditure and frequency, the purpose and extent of self-care, monthly expenditure, and the perceived reliability and use of self-care information sources. A $p$ value < 0.05 was considered statistically significant. All statistical analyses were performed using SPSS version 21.0 (IBM, Chicago, IL, USA).

## 3. Results

### 3.1. Self-care prevalence and reasons for self-care

The results showed that the self-care prevalence rate was highest in Japan at 54.9%, with rates of ~40% in other countries. In the analysis of self-care prevalence according to category, self-care most commonly involved supplements, followed by devices, physical activities, and information-seeking activities in all four countries. The prevalence of supplement use was between 35.2% and 38.5% in all countries, with no significant differences between countries. Device use was more common in Japan than it was in Australia, physical activities were more common in the USA than they were in Australia and Japan, and information-seeking activities were more common in the UK and the USA than they were in Australia and Japan (Table 2).

The primary reason for practicing self-care was "to manage my healthcare myself" in all countries (45.7%, 59.5%, 49.2%, and 41.1% of participants in Australia, Japan, the UK, and the USA, respectively). In Australia, the UK, and the USA, the second most common reason for practicing self-care was that it was considered "cost effective" (31.4%, 23.4%, and 34.8% of participants, respectively). However, in Japan, this was the third most common reason cited (5.7% of participants), and the second most common reason for practicing self-care was that it was "convenient to use" (33.1% of participants).

### 3.2. Relationships between age and self-care prevalence, expenditure, and frequency

A significant linear association was observed between age and self-care prevalence in all four countries ($p < 0.05$). Prevalence decreased with age in the UK, the USA, and Australia, and increased with age in Japan. No age-related trends were observed for self-care prevalence.

In those who were actively engaged in self-care, mean monthly self-care expenditure in USD [percentages of the gross domestic product (GDP)] was $91.80 (1.7%), $91.70 (2.5%), $70.20 (2.3%), and $119.90 (2.9%) in Australia, Japan, the UK, and the USA, respectively. The highest levels of self-care expenditure were reported by participants aged 40–44 years in Australia, 30–34 years in Japan and the USA, and 35–39 years in the UK. The proportion of income allocated to self-care expenditure for each respondent showed sharp peaks in those aged 30–34 years in Australia and Japan; however, this proportion decreased with age in the UK ($p < 0.05$; Fig. 2).

We performed multiple regression analysis to determine whether age was related to self-care expenditure after controlling for income. The results showed that self-care expenditure decreased significantly with age after adjusting for income in the UK ($p < 0.05$) and USA ($p < 0.05$). The relationship between age and self-care frequency was examined using Spearman's rank-correlation analysis, which showed a positive correlation between the two variables in the USA ($p < 0.05$), Australia ($p < 0.01$), and Japan ($p < 0.05$).

### 3.3. Widely used self-care modalities and monthly expenditure

Vitamins were the most widely used supplements in those actively engaged in self-care in all four countries, with prevalence rates (mean monthly expenditure in USD) of 85.3% ($30.90), 77.0% ($41.80), 80.5% ($20.30), and 89.6% ($29.50) in Australia, Japan, the UK, and the USA, respectively. The blood pressure monitor was the most widely used device in Japan, with a prevalence rate of 43.7% and mean monthly expenditure of $1.60, while fitness equipment was the most widely used device in the remaining three countries, with prevalence

| Table 2 – Self-care prevalence | | | | | |
|---|---|---|---|---|---|
| | Australia (n = 944) | Japan (n = 1,439) | UK (n = 798) | USA (n = 716) | p |
| ≥ 1 type of self-care | 381 (40.4)[b] | 790 (54.9)[a] | 344 (43.1)[b] | 304 (42.5)[b] | < 0.001[*] |
| ≥ 3 types of self-care | 223 (23.6)[b] | 215 (14.9)[c] | 209 (26.2)[ab] | 206 (28.8)[a] | < 0.001[*] |
| Number of uses | 3.6 ± 2.7[b] | 2.3 ± 2.1[b] | 3.6 ± 2.5[b] | 4.8 ± 3.6[a] | < 0.001 |
| Self-care practice according to category | | | | | |
|   Supplements | 339 (35.9)[a] | 506 (35.2)[a] | 293 (36.7)[a] | 276 (38.5)[a] | < 0.477 |
|   Devices | 222 (23.5)[b] | 448 (31.1)[a] | 210 (26.3)[ab] | 192 (26.8)[ab] | < 0.001[*] |
|   Physical activities | 124 (13.1)[bc] | 161 (11.2)[c] | 134 (16.8)[ab] | 155 (21.6)[a] | < 0.001[*] |
|   Information-seeking activities | 80 (8.5)[b] | 135 (9.4)[b] | 107 (13.4)[a] | 106 (14.8)[a] | < 0.001[*] |

Data are presented as $n$ (%) or mean ± standard deviation.

[*] $p < 0.5$; values in the same row that do not share a common superscript ([a,b,c,d]) differed significantly in post hoc tests (Bonferroni correction for self-care prevalence, Scheffé's post hoc test for number of uses).
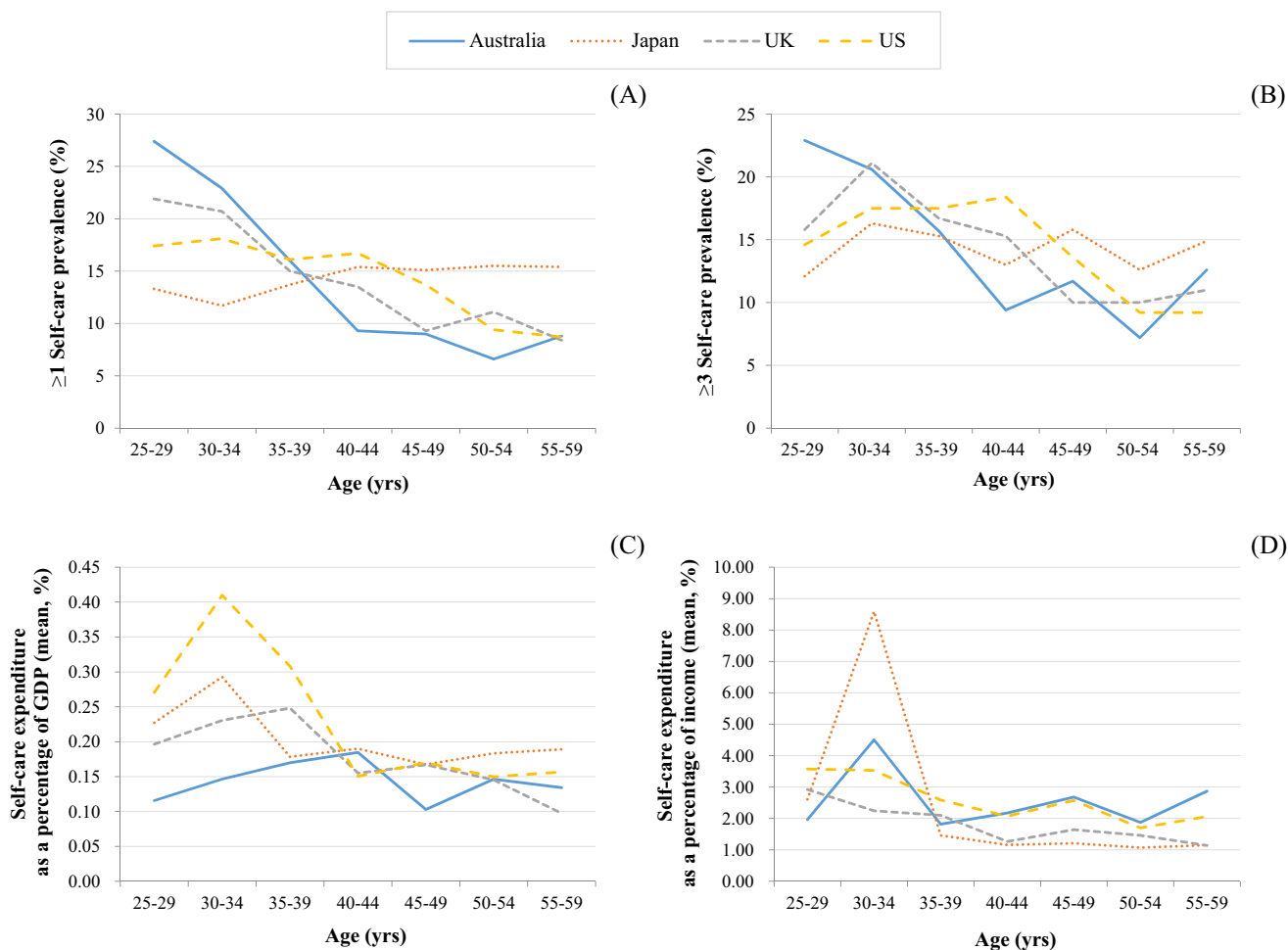
Fig. 2 – Self-care prevalence and expenditure. (A) Prevalence for the practice of one or more types of self-care. (B) Prevalence for the practice of three or more types of self-care according to age group. (C) Self-care expenditure as a percentage of the GDP according to age group in participants who practiced three or more types of self-care. (D) Self-care expenditure as a percentage of income according to age group in participants who practiced three or more types of self-care. GDP, gross domestic product.

rates (mean monthly expenditure in USD) of 44.7% ($35.20), 48.0% ($7.70), and 48.8% ($9.10) in Australia, the UK, and the USA, respectively. Yoga was the most widely used physical activity in all four countries, with prevalence rates (mean monthly expenditure in USD) of 23.0% ($35.30), 26.8% ($49.10), 34.0% ($31.70), and 39.8% ($35.70) in Australia, Japan, the UK, and the USA, respectively. Books constituted the most widely used information-seeking activity in all four countries, with prevalence rates (mean monthly expenditure in USD) of 18.9% ($17.10), 26.3% ($35.00), 28.5% ($14.70), and 30.8% ($19.60) in Australia, Japan, the UK, and the USA, respectively (Table 3).

In all self-care categories, participants who were actively engaged in self-care in Australia, Japan, the UK, and the USA reported spending more money per month on other devices ($73.60), Tai Chi ($231.90), yoga ($31.70), and paid websites and applications ($37.70), respectively, relative to that spent on other items.

### 3.4. Self-care purpose and frequency

In all four countries, over-the-counter (OTC) medication was used mainly "to relieve undiagnosed subjective symptoms." Meditation and aromatherapy were used "to relieve stress" in all countries other than Australia, where the primary purpose of using aromatherapy was "to relieve undiagnosed subjective symptoms." The remaining prevalent modalities were all used "to improve general health."

With regard to the frequency of self-care product and activity use, vitamins and health supplements were used at least once daily, while OTC medication was used less frequently (1–3 times/mo). In the information-seeking activities category, books and specialized health magazines were used from once per month to once per week, while paid websites or applications were used daily in all countries other than the UK (Table 4).

| Table 3 – Widely used self-care products and activities and monthly expenditure[*] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Australia | | | Japan | | | UK | | | USA | | |
| Category | Product/ Activity | Prevalence (%) | Mean expenditure (USD) | Product/ Activity | Prevalence (%) | Mean expenditure (USD) | Product/ Activity | Prevalence (%) | Mean expenditure (USD) | Product/ Activity | Prevalence (%) | Mean expenditure (USD) |
| Supplements | Vitamins | 85.3 | 30.9 | Vitamins | 77.0 | 41.8 | Vitamins | 80.5 | 20.3 | Vitamins | 89.6 | 29.5 |
| | Health supplements | 69.1 | 27.2 | Health supplements | 48.8 | 53.3 | Health supplements | 63.0 | 18.1 | Health supplements | 69.7 | 28.1 |
| | OTC medication | 47.0 | 11.8 | OTC medication | 32.4 | 38.8 | OTC medication | 38.0 | 8.5 | OTC medication | 61.2 | 16.6 |
| Devices | Fitness equipment | 44.7 | 35.2 | Blood pressure meter | 43.7 | 1.6 | Fitness equipment | 48.0 | 7.7 | Fitness equipment | 48.8 | 9.1 |
| | Heat therapy equipment | 30.0 | 3.3 | Massager | 36.6 | 3.8 | Blood pressure meter | 27.5 | 4.1 | Aromatherapy | 34.3 | 7.8 |
| | Aromatherapy | 28.6 | 13.0 | Aromatherapy | 31.0 | 6.4 | Aromatherapy | 25.0 | 9.1 | Massager | 30.8 | 15.6 |
| Physical activities | Yoga | 23.0 | 35.3 | Yoga | 26.8 | 49.1 | Yoga | 34.0 | 31.7 | Yoga | 39.8 | 35.7 |
| | Meditation | 19.8 | 7.3 | Other Activities | 9.4 | 10.0 | Meditation | 21.5 | 7.3 | Meditation | 26.9 | 4.4 |
| | Other activities | 9.7 | 22.8 | Meditation | 7.5 | 86.6 | Other activities | 10.0 | 19.5 | Other Activities | 11.9 | 18.5 |
| Information-seeking activities | Books on healthcare | 18.9 | 17.1 | Books on healthcare | 26.3 | 35.0 | Books on healthcare | 28.5 | 14.7 | Books on healthcare | 30.8 | 19.6 |
| | Specialized health magazines | 16.6 | 8.8 | Specialized health magazines | 23.5 | 40.4 | Specialized health magazines | 22.0 | 10.0 | Specialized health magazines | 25.4 | 9.6 |
| | Paid mobile applications | 5.1 | 23.2 | Paid websites or applications | 6.6 | 90.8 | Paid websites or applications | 5.0 | 16.6 | Paid websites or applications | 7.5 | 37.7 |

[*] For each country, the three mostly widely used modalities in each category are listed in descending order of prevalence.
OTC, over the counter; USD, United States dollars.

**Table 4 – Main purpose and frequency for prevalent products and activities in each self-care category**

| Category | Modality[*] | Australia Prevalence (%) | Australia Frequency (%) | Japan Prevalence (%) | Japan Frequency (%) | UK Prevalence (%) | UK Frequency (%) | USA Prevalence (%) | USA Frequency (%) |
|---|---|---|---|---|---|---|---|---|---|
| Supplements | Vitamins | HE (84) | 1/d (64) | HE (80) | 1/d (53) | HE (89) | 1/d (54) | HE (88) | 1/d (65) |
|  | Health supplements | HE (69) | 1/d (57) | HE (79) | 1/d (48) | HE (79) | 1/d (50) | HE (85) | 1/d (54) |
|  | OTC medication | SY (50) | 1/mo (32) | SY (52) | 1/mo (39) | SY (55) | 2–3/mo (42) | SY (42) | 1/d, 2–3/mo (20) |
| Devices | Fitness equipment | HE (82) | 2–3/wk (37) | HE (78) | 2–3/wk (37) | HE (79) | 2–3/wk (43) | HE (81) | 4–6/wk (29) |
|  | Blood pressure meter | HE (46) | 2–3/mo (29) | HE (49) | 1/wk (27) | HE (33) | 1/mo (29) | HE (48) | 1/wk (22) |
|  | Aromatherapy | SY (71) | 2–3/mo (29) | ST (80) | 2–3/w (36) | ST (82) | 1/wk (26) | ST (72) | 2–3/mo (23) |
| Physical activities | Yoga | HE (62) | 2–3/wk (26) | HE (68) | 1/wk (30) | HE (51) | 2–3/wk (38) | HE (55) | 1/wk (30) |
|  | Meditation | ST (60) | 1/d (33) | ST (56) | 1/wk (25) | ST (67) | 2–3/wk (26) | ST (70) | 2–3/wk (30) |
|  | Other physical activities | HE (57) | 2–3/wk (29) | HE (70) | 2–3/wk (30) | HE (70) | 1/d (30) | HE (67) | 1/mo, 1/d (29) |
| Information-seeking activities | Books | HE (61) | 1/mo (37) | HE (64) | 1/mo (39) | HE (63) | 1/wk (35) | HE (74) | 2–3/mo (29) |
|  | Specialized health magazines | HE (72) | 1/mo (42) | HE (70) | 1/mo (36) | HE (77) | 1/mo (32) | HE (71) | 1/wk (29) |
|  | Paid websites or applications | HE (50) | 1/d (30) | HE (86) | 1/d (29) | HE (40) | 1/mo, 1/wk (30) | HE (60) | 1/d (27) |

[*] The three mostly widely used products or activities in each category are listed in descending order of prevalence; 1/mo, at least once per month; 1/wk, once per week; 2–3/wk, 2–3 times per week; 4–6/wk, 4–6 times per week; and 1/d, at least once daily.
HE, to improve general health; OTC, over the counter; ST, to relieve stress; SY, to relieve undiagnosed subjective symptoms.

### 3.5. *Perceived reliability and sources of self-care information*

We analyzed information sources to determine the frequency with which they were used and their reliability as perceived by participants who were actively engaged in self-care. Of the widely used sources of information, family and relatives (reliability ranking, 1; frequency ranking, 1) and friends and colleagues (reliability ranking, 2; frequency ranking, 2) were considered the most reliable sources of information, followed by internet search engines (reliability ranking, 7; frequency ranking, 5) and information obtained from pharmacies (reliability ranking, 5; frequency ranking, 7). Television programs (reliability ranking, 12; frequency ranking, 3) and advertisements (reliability ranking, 15; frequency ranking, 6) were considered less reliable, but used frequently. Books, CDs/DVDs (reliability ranking, 4; frequency ranking, 11), and social media (reliability ranking, 6; frequency ranking, 13) were considered reliable, but used infrequently (Fig. 3).

## 4.    Discussion

The results of this cross-sectional study examining self-care patterns indicated that ~40% of respondents from the UK, US, and Australia and 50% of those from Japan practiced self-care. Approximately 20% of respondents practiced at least three types of self-care. The expenditure reported by those who practiced at least three types of self-care was between USD 79.2 (UK) and USD 119.9 (USA) and peaked in those aged 30–44 years.

The primary reason for practicing self-care in all four countries was "to manage my healthcare myself." Therefore, we assumed that the desire for self-reliance was present in participants from all four countries and served as motivation for practicing self-care. Cost effectiveness was the second most common reason for practicing self-care use in the UK, the USA, and Australia; however, convenience was the second most common reason in Japan.

We analyzed the main purpose for practicing self-care according to product or activity and the frequency of self-care product and activity use. Purposes were largely similar, with slight differences between countries. OTC medication was used mainly to relieve undiagnosed subjective symptoms, and meditation was used to relieve stress, while other prevalent products and activities were used mainly to improve general health. With regard to frequency of product and activity use, vitamins and health supplements were mainly used at least once daily, while OTC medication was used much less frequently at 1–3 times/mo. Information-seeking activities, such as paid websites or web-based applications, were used daily in most countries, whereas books and specialized health magazines were used less frequently (e.g., once monthly or weekly). These results reflect current trends, which indicate that the internet is a predominant source of various types of information, including that concerning health.[12]

In our study, which included adults aged 25–59 years, age was associated with self-care prevalence, expenditure, and frequency. Self-care prevalence decreased significantly with age in the UK, US, and Australia, and self-care expenditure
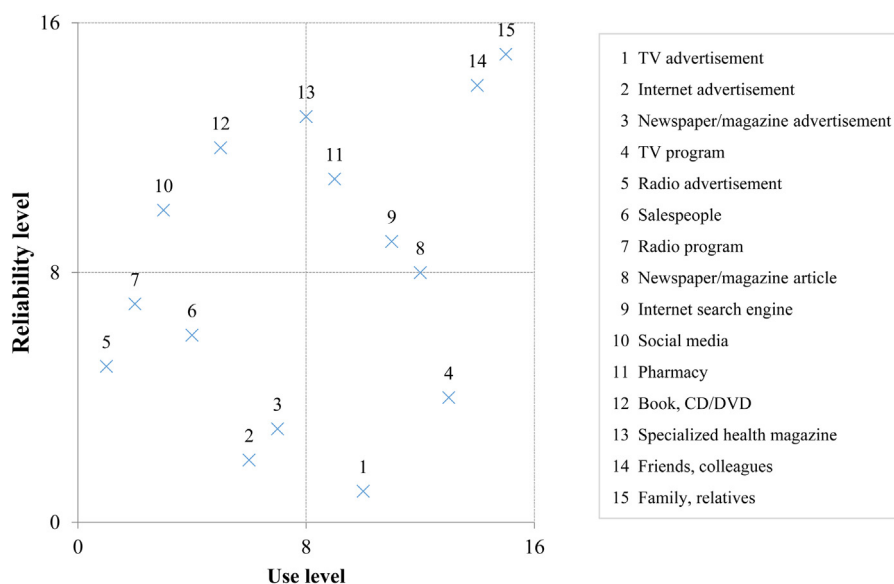
**Fig. 3 – The use and perceived reliability of self-care information sources.**

decreased with age in the UK and the USA. However, in Japan, self-care prevalence increased with age; this trend is attributable to an increase in the use of supplements and devices by older adults in Japan. Some previous studies that explored the relationship between age and self-care reported that older adults relied heavily on self-care,[13] while others reported that older adults engaged less actively in self-care relative to younger individuals.[14] By contrast, we observed greater engagement in self-care with increased age in the USA, Australia, and Japan. This is congruent with the results of a previous study indicating that the time spent on self-care increased with age in adults > 25 years of age in the USA.[15] Based on the findings indicating that self-care prevalence and expenditure decreased with age and self-care frequency increased with age, we could assume that a relatively small number of older adults practiced self-care; however, once they did so, they appeared to devote relatively more time to the endeavor as compared to that observed in younger adults.

Self-care expenditure rates as percentages of GDP in the countries surveyed were 2.9% in the USA, 2.5% in Japan, 2.3% in the UK, and 1.7% in Australia. Furthermore, the percentages of total health expenditure accounted for by self-care[16] were 26.5% in Japan, 24.1% in the UK, 18.7% in Australia, and 16.2% in the USA. The low value observed for the USA could be partly attributed to the fact that total health expenditure (a percentage of the GDP) was higher in the USA (17.9%) relative to that observed in the other countries (9.3% in the UK, 9.3% in Japan, and 9.0% in Australia). Japan exhibited the highest percentage of total expenditure accounted for by self-care; this finding is consistent with that of a previous study, which showed a higher tendency toward practicing self-care for perceived mild and serious symptoms and lower preference for physician care in Japan relative to that observed in the USA.[10]

In the current study, those who practiced self-care acquired information primarily from acquaintances that were considered the most reliable source of this type of

information.[17] Additionally, internet search engines and information obtained from pharmacies were considered reliable and widely used sources of self-care information. Although acquaintances and the internet were considered reliable and used widely, information obtained from these sources could be incorrect or inappropriate for use by certain individuals. In the UK, self-care for minor ailments, which is facilitated by community pharmacies, is guided mainly by health policies within the country.[18] The provision of information in pharmacies concerning self-care could help to reduce the risks associated with incorrect self-care practice. Additionally, the development and promotion of technology aimed at guiding consumers toward trustworthy health-related information on the internet (e.g., the Collaboration for Internet Rating, Certification, Labeling, and Evaluation of Health Information or MedCIRCLE) could facilitate appropriate self-care practice.[19,20]

Demand for consumer- or patient-centered healthcare has increased,[25,26] indicating that the high prevalence of chronic diseases in modern society could be managed effectively via self-care.[21–24] To predict the future of the self-care market, we examined self-care patterns in adults aged 25–59 years, as individuals within this age group are considered economically active and independent. We also focused on usage patterns for self-driven healthcare products and activities in participants who were actively engaged in self-care. To our knowledge, this was the first study to assess self-care patterns in individuals actively engaged in self-care, who are most likely to practice self-care in the future. Moreover, trends in self-care according to age, inconsistency in self-care practice, and the reliability of self-care information sources could be used as a reference for the development of products or services related to self-care.

This study was subject to several limitations. First, respondents participated in the survey via e-mail, which meant that the sample was limited to internet users. However, internet penetration in each of the surveyed countries was higher (88.8% in Australia, 83.6% in the UK, 79.5% in Japan, and 78.1%

in the USA) than the global average (34.3%).[27] Second, as we intended to examine self-care patterns in individuals considered more likely to purchase self-care products in the future, we asked respondents who practiced at least three types of self-care about the following factors: self-care expenditure and frequency, purposes of self-care, and sources of self-care information. Because we focused on individuals who practiced at least three types of self-care, the study could not yield information about the above-mentioned factors for those who practiced only one or two types of self-care. The examination of individuals who practiced fewer than three types of self-care was limited to information regarding prevalence and reasons for practicing self-care, which was obtained during initial screening. Third, we did not limit the recall period. Rather, we asked respondents whether they had ever practiced self-care or practiced it at the time of the study. We then analyzed responses in terms of current usage. Although this could have reduced the possibility of recall bias, the risk of differences in respondent interpretation of current use could not be eliminated.

In conclusion, in the UK, the USA, Australia, and Japan, ~40–50% of respondents practiced self-care mainly to manage their own healthcare and because they considered it cost effective. Supplements were the most commonly used self-care product or activity, followed by devices, physical activities, and information-seeking activities. For the respondents who actively engaged in self-care ($\geq$ 3 types of self-care), average monthly self-care expenditure was approximately USD 100 (range, 1.7–2.9% of the GDP). Self-care prevalence decreased with age in the UK, the USA, and Australia, and self-care expenditure decreased with age in the UK and USA. However, self-care frequency increased with age in the USA, Australia, and Japan. Aside from acquaintances, internet search engines and information obtained at pharmacies were the only widely used sources of self-care information that were considered reliable. When developing self-care products or services, healthcare providers and policy makers should consider these self-care patterns.

## Conflicts of interest

The authors declare that they have no competing interests.

## Acknowledgments

REFERENCES

1. Landers SH. Why health care is going home. *N Engl J Med* 2010;363:1690–1.
2. Russell-Johnson H. Paternalism to partnership. *Pediatr Nurs* 1995;7:9.
3. Transparency Market Research. Self-care medical devices market—global industry analysis, size, share, growth, trends and forecast, 2013–2019. 2014.
4. Department of Health and Aging. *Primary health care reform in Australia: report to support Australia's first national primary health care strategy.* Canberra, A.C.T.: Dept. of Health and Ageing; 2009. http://www.libcat.health.nt.gov.au/cgi-bin/koha/opac-MARCdetail.pl?biblionumber=15508.
5. Centers for Disease Control and Prevention. Chronic disease self-management programs. http://www.cdc.gov/arthritis/interventions/marketing-support/1-2-3-approach/docs/pdf/provider_fact_sheet_overview.pdf. Accessed January 2, 2016.
6. Ostermann H, Renner A, Bobek J, Schneider P, Vogler S. European Union. A cost/benefit analysis of self-care systems in the European Union. Final report. Brussels: European Commission; 2015.
7. Ryan A, Wilson S, Taylor A, Greenfield S. Factors associated with self-care activities among adults in the United Kingdom: a systematic review. *BMC Public Health* 2009;9:96.
8. Yuefeng L, Keqin R, Xiaowei R. Use of and factors associated with self-treatment in China. *BMC Public Health* 2012;12: 995.
9. Slater H, Briggs AM, Bunzli S, Davies SJ, Smith AJ, Quintner JL. Engaging consumers living in remote areas of Western Australia in the self-management of back pain: a prospective cohort study. *BMC Musculoskelet Disord* 2012;13:69.
10. Haug MR, Akiyama H, Tryban G, Sonoda K, Wykle M. Self-care: Japan and the U.S. compared. *Soc Sci Med* 1991;33:1011–22.
11. Meetoo D, Temple B. Issues in multi-method research: constructing self-care. *Int J Qual Methods* 2003;2:1–21.
12. Cline RJ, Haynes KM. Consumer health information seeking on the internet: the state of the art. *Health Educ Res* 2001;16:671–92.
13. Grzywacz JG, Arcury TA, Bell RA, Lang W, Suerken CK, Smith SL, et al. Ethnic differences in elders' home remedy use: sociostructural explanations. *Am J Health Behav* 2006;30:39–50.
14. Department of Health. *Self-care—A real choice self-care support—a practical option.* London: Department of Health; 2005.
15. Jonas DE, Ibuka Y, Russell LB. How much time do adults spend on health-related self-care? Results from the American time use survey. *J Am Board Fam Med* 2011;24:380–90.
16. The World Bank. Total health expenditure as a percentage of GDP (The World Bank). http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS. Accessed January 11, 2015.
17. Nunez MA, Yarandi H, Nunez-Smith M. Self-management among patients living with diabetes in the United States Virgin Islands. *J Health Care Poor Undeserved* 2011;22:271–83.
18. Paudyal V, Hansford D, Cunningham S, Stewart D. Pharmacy-assisted patient self-care of minor ailments: a chronological review of UK health policy documents and key events 1997–2010. *Health Policy* 2011;101:253–9.
19. Eysenbach G, Powell J, Kuss O, Sa ER. Empirical studies assessing the quality of health information for consumers on the world wide web: a systematic review. *J Am Med Assoc* 2002;287:2691–700.
20. Wang Y, Liu Z. Automatic detecting indicators for quality of health information on the web. *Int J Med Inform* 2007;76:575–82.
21. Shrivastava SR, Shrivastava PS, Ramasamy J. Role of self-care in management of diabetes mellitus. *J Diabetes Metab Disord* 2013;12:14.
22. Mehuys E, Paemeleire K, Van Hees T, Christiaens T, Van Bortel LM, Van Tongelen I, et al. Self-medication of regular headache: a community pharmacy-based survey. *Eur J Neurol* 2012;19:1093–9.
23. Kua CH, Ng ST, Lhode R, Kowalski S, Gwee KA. Irritable bowel syndrome and other gastrointestinal disorders: evaluating self-medication in an Asian community setting. *Int J Clin Pharm* 2012;34:561–8.

24. Kong SC, Hurlstone DP, Pockock CY, Walkington LA, Farquharson NA, Bramble MG, et al. The incidence of self-prescribed oral complementary and alternative medicine use by patients with gastrointestinal diseases. *J Clin Gastroenterol* 2005;39:138–41.

25. Calabretta N. Consumer-driven, patient-centered health care in the age of electronic information. *J Med Libr Assoc* 2002;90:32–7.

26. Buntin MB, Damberg C, Haviland A, Kapur K, Lurie N, McDevitt R, et al. Consumer-directed health care: early evidence about effects on cost and quality. *Health Aff* 2006;25:w516–30.

27. Internet World Stats. Internet usage statistics. http://www.internetworldstats.com/stats.htm. Accessed January 11, 2015.