Gender differences in the intention to withhold life-sustaining treatments involving severe dementia for self and on behalf of parent or spouse

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Abstract

Background Few studies have explored gender differences in the attitudes toward advanced care planning and the intention to withhold life-sustaining treatments (LSTs) involving severe dementia in Asian countries. We examined gender differences in the attitude toward the Patient Autonomy Act (PAA) in Taiwan and how the gender differences in these attitudes affect the intention to withhold LSTs for severe dementia. We also investigated self–other differences in the intention to withhold LSTs between genders.

Methods Between March and October 2019, a structured questionnaire was distributed to hospitalized patients’ family members through face-to-face contact in an academic medical center. Exploratory factor analysis and independent and paired-sample t-tests were used to describe gender differences. Mediation analyses controlled for age, marital status, and education level were conducted to examine whether the attitude toward the PAA mediates the gender effect on the intention to withhold LSTs for severe dementia.

Results Eighty respondents filled out the questionnaire. Exploratory factor analysis of the attitude toward the PAA revealed three key domains: regarding the PAA as (1) promoting a sense of abandonment, (2) supporting patient autonomy, and (3) contributing to the collective good. Relative to the men, the women had lower average scores for promoting a sense of abandonment (7.48 vs. 8.94, p = 0.030), higher scores for supporting patient autonomy (8.74 vs. 7.94, p = 0.006), and higher scores for contributing to the collective good (8.64 vs. 7.47, p = 0.001). Compared with the women, the men were less likely to withhold LSTs for severe dementia (15.84 vs. 18.88, p = 0.01). Mediation analysis revealed that the attitude toward the PAA fully mediated the gender differences in the intention to withhold LSTs for severe dementia. Both men and women were more likely to withhold LSTs for themselves than for their parents. Compared with the women, the men were more likely to withhold resuscitation for themselves than for their parents (p = 0.05). Women were more likely to agree to enteral tube feeding and a tracheotomy for their husbands than for themselves; men made consistent decisions for themselves and their wives in those LST scenarios.

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**Introduction**

The treatments people choose near the end of life may differ from those they receive [1]. End-of-life (EOL) decisions are commonly arranged through advance directives (ADs), legal documents that outline treatment preferences, or by designating power of attorney to ensure that patients receive care consistent with their wishes when incapacitated. Studies highlight the benefits of ADs, with patients in the United States having ADs being less likely to die in the hospital [1–3] and more likely to receive care that is consistent with their preferences [2], and have surrogates who report more effective communication with physicians near the end of life [3]. However, many patients may have limited knowledge of future treatments, and thus they may be reluctant to complete an AD [4]. The absence of an AD may lead to the application of non-beneficial therapies that can increase suffering for patients and their families.

The Patient Autonomy Act (PAA), which was passed in Taiwan in 2019 [5], is the first relevant legislation in Asia to protect a patient’s right to natural death; it allows individuals aged ≥ 20 years to make decisions through advanced care planning, and complete a written AD to decline medical treatments in specific clinical scenarios in case of incapacity [5]. With the PAA, capable adults can provide written EOL care instructions and complete a durable power of attorney for health care. The person appointed in this document will make treatment decisions for the patient in case of incapacitation. Such requests have long been subject to legal protection in Western countries, such as that provided by the Patient Self-Determination Act passed by the US Congress in 1990 and the Mental Capacity Act passed in the United Kingdom in 2005 [6, 7]. Despite the rights afforded by the Patient Self-Determination Act, the rate of advanced care planning remains low [8]. A recent systematic review examining studies published between 2011 and 2016 indicated that only approximately 36.7% of US adults have ADs [9]. In the UK, the estimated proportion of adults with ADs is about 4% in England and just 2% in Wales, while in Germany, approximately 10% of the general population [10]. In Taiwan, less than 0.2% of the adult population (35,545 out of roughly 19.39 million adults) had completed an AD by the end of 2021 [11]. Life-sustaining treatments (LSTs) are widely used for patients approaching the end of life [12, 13], highlighting the importance of understanding the barriers to AD completion [14].

Cultural norms influence attitudes regarding patient autonomy in decisions about EOL care [15]. Individuals with positive attitudes toward patient autonomy exhibit greater willingness to sign an AD [16]; moreover, willingness to sign an AD is positively associated with older age, higher educational attainment [17], white race [3], employment, knowledge of hospice and palliative care [18], comprehensions of the illness condition [18, 19], and life satisfaction [20]. Several studies also point to sex-based gender differences in the preferences for life-sustaining treatments. For example, a qualitative study reported gender differences in attitudes concerning advance care planning, with men fearing harm from health treatments and hesitant to disclose EOL wishes to physicians. By contrast, women anticipated the benefits of ADs and believed that having one could prevent unwanted mechanical life support [21]. A study in the United States, which tracked 301 advanced cancer patients, also found that male patients are more likely to receive life-prolonging medical treatments [22]. A multihospital survey of 2,329 patients with advanced cancer in Taiwan found that compared with men, women were less likely to regard prolonging life as a medical goal of end-stage cancer care and were more inclined not to receive intubation and ventilator therapy [23]. Another study in the United States indicated that the decisions to withhold or withdraw potentially life-prolonging treatments are more often made in women (28.0% vs. 22.8%, P = 0.003) [24]. Men with advanced cancers are more likely than women to receive aggressive, non-beneficial ICU care near death [25]. A recent systematic review of the literature reveals that women are more likely to withdraw or withhold life-prolonging treatments than men [26]. Although empirical findings point to sex-based differences in the preferences for life-sustaining treatments, few studies discuss the underlying socialized gender roles that may affect how men and women perceive EOL decision-making.

Despite their benefits, ADs might not be available for most hospitalized patients [2]; family members serve as surrogate decision-makers in such cases. Growing evidence suggests that the decisions of surrogate decision-makers often differ from those of patients [27], probably because of psychological distance [27] or social distance [28] between the two parties. Research has revealed that surrogate decisions regarding EOL care might not benefit the patient [29], whose wishes may be compromised in such situations [30]. These decisions might differ from
those the surrogate might make for themselves [31]. Family members as surrogates commonly regard their role as being the patient’s voice, an advocate for the patient, an advocate for other family members, or an advocate for themselves [32].

Surrogate decisions may also be affected by socialized gender roles. A study reported that surrogate choices in the United States are most likely to be made by daughters (58.9%) [33]. In Japan, female surrogates are more likely to change their preference from cardiopulmonary resuscitation (CPR) to do-not-resuscitate (DNR) orders than male surrogates [34]. In Chinese society, sons typically make surrogate decisions, although female family members are more likely to care for the patient [35, 36].

This study assumes that gender is socially constructed roles, behaviors, and attributes that a society considers appropriate for men and women. In Taiwan, although the gender gap has narrowed considerably in terms of educational attainment [37], the gender difference in the labor market participation rate persists (51.5% for women and 67% for men, Directorate-General of Budget, Accounting and Statistics [DGBAS], 2021). Wives, daughters, and daughters-in-law represent 63% of the caretakers of disabled or ill household members [38, 39]. A recent study revealed different disability trends for Taiwanese men and women aged ≥50 years, with women progressing 18% more rapidly than men toward more substantial disability after its initial onset; older age resulted in a 1.2 times faster rate of change in disability for women than for men (p<0.001) [40]. Women may experience higher fatigue levels than men at the end of life [41]. Women were also less likely to regard prolonging life as a medical goal of end-stage cancer care and were more inclined not to receive intubation and ventilator therapy [23]. Therefore, Taiwanese women may be expected to follow the gender role to be family-centered and probably internalize the sense of sacrifice to reduce family burden [42]. When facing the choices about life-sustainment treatments at the end of life, they may be more likely to withhold prolonging life treatments than men.

This study aims to examine gender differences in the attitude toward the Patient Autonomy Act (PAA) in Taiwan and how the gender differences in these attitudes affect the intention to withhold LSTs for severe dementia. We also hypothesize that gender differences might exist in self–other differences in the intention to withhold LSTs involving severe dementia.

**Methods**

**Study design**

We conducted a quantitative survey to investigate whether men and women differ in their intention to withhold LSTs in cases involving severe dementia for themselves and on behalf of their family members. The description of severe end-stage dementia—based on the Functional Assessment Staging Test [43, 44]—was as follows: “When you have severe dementia, you do not remember many things, forget many people, cannot express your needs, or understand others, and have a deteriorating mental state. You need someone to take care of your daily tasks for an extended period; for example, you need help getting dressed, eating, and taking a bath. Gradually, you become incontinent, your mobility diminishes, and you eventually need to be in a wheelchair or stay in bed for long periods.”

After the respondents read the description, they indicated their preferences for the following five medical interventions for prolonging life: (1) receiving enteral tube feeding if severe dementia hinders eating; (2) receiving dialysis for kidney failure; (3) being intubated on a ventilator if severe dementia makes breathing impossible; (4) undergoing a tracheotomy following one month of intubation and if survival appears unlikely without a ventilator; and (5) undergoing CPR if a cardiac arrest because of end-stage dementia [45].

Scenarios involving severe dementia were selected because providing a realistic prognosis for patients with dementia is challenging [46]. Realistic forecasts are essential for patients and caregivers to prepare for subsequent difficult situations. Several reasons are listed: (1) doctors and family members do not regard advanced dementia as a terminal disease; (2) excessive focus on cognitive and physical impairments can limit palliative care options; (3) patients with dementia often present distinct illness trajectories over a long period between diagnosis and death, often without an acute deterioration [47]. Before the introduction of the PAA, most doctors in Taiwan favored active treatment of patients with dementia to ensure that the patient’s medical needs were met and to avoid legal repercussions [48].

**Study sample**

This study was conducted at the National Taiwan University Hospital in Taipei, Taiwan, from March to October 2019. The data were collected through a structured questionnaire through face-to-face contact with the family members of patients treated in this hospital’s intensive care unit (ICU) and general internal medicine and surgical wards. All the participants provided written informed consent before participating in this study. This study was performed by the Declaration of Helsinki and approved by the National Taiwan University Research Ethics Committee (No. 201811035RNIB).

The inclusion criteria for the interview participants were as follows: (a) related by blood or law to an inpatient who had been hospitalized for 48 h or longer, (b) visited the patient more than twice during the patient’s hospitalization (or served as the primary caregiver during
the hospitalization), and (c) aged ≥ 20 years and able to answer interview questions. Potential participants were excluded if they could not speak or read Chinese fluently or could not be present at the hospital for the face-to-face interview. We assumed that recruiting family members of hospitalized patients would be more likely to reflect on matters concerning EOL decisions.

To determine the necessary number of respondents, we used the G*power program [49]. G*Power [50] was designed as a general stand-alone power analysis program for statistical tests in social and behavioral research. For studies with two to five predictors, the required sample size ranges from 68 to 92, for an effect size of 0.15, an error probability of 0.05, and a power (1 − B error probability) of 0.8. Therefore, we adopted a sample size of 100.

Analysis plan
First, univariate and bivariate analyses were conducted to examine the gender differences in variables of interest in this study. Second, independent and paired-sample t-tests (for self–other differences) were used to describe the difference between men and women. Third, exploratory factor analysis and reliability tests were used to examine the respondents’ attitudes toward the PAA. Lastly, we investigated whether men and women differ in their attitudes toward the PAA and whether the differences in the attitudes affect their intention to withhold LSTs for severe dementia by using mediation models.

The mediation models in Hayes’ PROCESS Macro (2022) were used to examine the direct, indirect, and total effect of gender on the intention to withhold LSTs for severe dementia (also see Fig. 1). Bootstrapping (5000 resamples) was used to estimate the 95% confidence interval (CI) for the aforementioned effects. All the statistical analyses were performed using SPSS 19.0 (SPSS, Chicago, IL, USA).

For the mediation analysis, we specifically examined (1) whether men and women differ in the intention to withhold LSTs for severe dementia (the direct effect “c”) and (2) whether men and women differ in their attitudes toward the PAA (the effect “a”), and (3) whether these attitudes toward the PAA affect the intention to withhold LSTs for severe dementia (the effect “b”). The total effect of gender is the direct effect (“c”) plus the indirect effect (“ab”) (see Fig. 1).

Measures
Based on the previous studies [45, 51], we adopted a modified Chinese version of the Life Support Prevalence Questionnaire (LSPQ) to measure respondents’ preferences for life-sustaining treatments for severe dementia. Second, we developed a questionnaire and invited three experts to review the feasibility of its contents. The questionnaire consisted of two parts, which evaluated the following: (1) general attitude toward the PAA and (2)
hypothetical LST decisions involving severe dementia for themselves and on behalf of people close to them.

Outcome variables
Intention to Withhold LSTs for severe dementia was defined according to respondent ratings for the following five medical interventions for prolonging life: (1) receiving enteral tube feeding if severe dementia hinders eating; (2) receiving dialysis for kidney failure; (3) being intubated on a ventilator if severe dementia makes breathing impossible; (4) undergoing a tracheotomy following one month of intubation and if survival appears unlikely without a ventilator; and (5) undergoing CPR if a cardiac arrest because of end-stage dementia. Respondents rated each medical intervention on a 5-point Likert scale from 1 (strongly agree) to 5 (strongly disagree). Exploratory factor analysis was performed, and one factor with an explained variance of 54% was found. This factor has a Cronbach’s α value of 0.92. We summed the ratings of these five medical interventions, yielding scores ranging from 5 to 25: a higher score indicates a stronger intention to withhold LSTs for severe dementia.

Explanatory variables
Gender was coded as 1 for men and 0 for women. Attitude toward the PAA was defined according to responses to nine items on how respondents regarded the PAA. Items were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Exploratory factor analysis was conducted, and three factors were identified: Factor 1, promoting a sense of abandonment, comprised four items: With the PAA, (1) I am basically waiting to die; (2) I feel insecure about my medical treatments in the future; (3) my quality of care will not be guaranteed; (4) healthcare providers will no longer care for any of my medical conditions. This factor had a Cronbach’s α value of 0.79, and the total score ranged from 4 to 20. Factor 2, supporting patient autonomy, included two items: The PAA can (1) reduce the pressure on family members when making decisions and (2) ensure that my medical treatment decisions are respected. The second factor had a Cronbach’s α value of 0.74, and the total scores ranged from 2 to 10. The third factor, contributing to the collective good, comprised three items: With the PAA, (1) futile medical care can be reduced; (2) healthcare providers are protected from lawsuits while providing the treatment that I prefer; and (3) inefficient medical resource usage can be reduced. Factor 3 had a Cronbach’s α value of 0.88, and the total scores ranged from 4 to 20.

Control variables
Education level was defined as the highest diploma respondents obtained. Because most respondents had a college diploma, we coded 1 as college and above and 0 as high school and below.

Age was treated as a continuous variable.

Marital status could be single or never married, married, divorced, or cohabitating. Because of the small number of divorced or cohabitating respondents, we coded 1 as married and 0 as not married.

Results
One hundred potential participants were approached during the study, and 82 filled out the questionnaire successfully. Because of the COVID-19 pandemic at the time of the survey, access to the hospital for face-to-face contact for filling out the questionnaire was denied, hindering the recruitment of more respondents. Of the 82 questionnaires collected, 2 had missing data and were excluded from the analysis, yielding an effective response rate of 80%. Table 1 presents the demographic characteristics of the respondents and gender differences in these characteristics. Of the study respondents, 52.5% were women, 87.6% had a college education or higher, and 40% resided in Taipei City (where the hospital was located). Approximately 41.3% of the respondents’ family members (the patients) were admitted to the ICU at the time of the interview. About one-third (32.5%) of the respondents were the patients’ parents, 22.5% were the patients’ children, and 19% were the patients’ spouses. No gender differences were observed in these demographic characteristics.

Gender differences were discovered across all three factors for attitude toward the PAA (Table 2). The men had higher average scores regarding the PAA promoting a sense of abandonment than the women (8.94 vs. 7.48; \( p < 0.05 \)). However, the women had higher scores for supporting patient autonomy (8.74 vs. 7.94; \( p < 0.01 \)) and contributing to the collective good (8.64 vs. 7.47, \( p < 0.001 \)) than the men.

Gender differences in the intention to withhold LSTs for severe dementia
As indicated in Table 3, compared to the women, the men were less likely to withhold LSTs for severe dementia (total scores, 15.84 vs. 18.88, \( p = 0.01 \)). The men less likely to agree to withhold invasive LSTs even in case of severe dementia than were the women (enteral tube feeding, men vs. women 2.78 vs. 3.36, \( p = 0.05 \); dialysis, 2.66 vs. 3.43, \( p = 0.02 \); intubation with a ventilator, 3.23 vs. 3.93, \( p = 0.02 \); tracheotomy, 3.50 vs. 4.12, \( p = 0.01 \)). Yet, men and women showed no difference in the intention to withhold resuscitation in case of a cardiac arrest (3.65 vs. 4.07, \( p = 0.2 \)).
Gender differences in self–other differences in the intention to withhold LSTs for severe dementia

Regarding the intention to withhold LSTs for people close to the respondents, if those people had severe dementia, 42 (52.5%), 31 (38.8%), 3 (4%), and 4 (5%) of the respondents referred to parents, spouses, children, and friends, respectively, as people for whom they would make LSTs decisions. Table 3 summarizes the self–other differences in the respondents’ intention to withhold LSTs for severe dementia. The mean values indicate the differences between the respondents’ intention to withhold LSTs for themselves and those on behalf of their parents or spouses. A greater mean difference indicates greater discordance.

In terms of making hypothetical LST decisions for parents, both men and women tend to agree to treatments for their parents rather than themselves. The self–parent differences in the respondents’ decisions regarding enteral tube feeding was 0.67 (p = 0.05) for men and 0.54 (p = 0.05) for women, regarding dialysis was 0.60 (p = 0.001) for men and 0.50 (p = 0.01) for women, regarding intubation on a ventilator was 0.72 (p = 0.01) for men and 0.75 (p = 0.01) for women, and regarding tracheotomy was 0.28 (nonsignificant) for men and 0.33 (p = 0.001) for women. No gender differences were observed in these self–other differences. The only significant gender difference was noted for conducting CPR if a cardiac arrest because of end-stage dementia (self–parent

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**Table 1** Demographic Characteristics of the Family Members of Hospitalized Patients (N = 80)

| Variables                          | All (N = 80) | %/SD | Men (N = 38, 47.5%) | %/SD | Women (N = 42, 53.5%) | %/SD | X2/Independent two-sample t-test |
|------------------------------------|-------------|------|---------------------|------|-----------------------|------|-------------------------------|
| Age (mean)                         |             |      |                     |      |                       |      |                               |
|                                    | 45.10yrs    | 12.07| 47.1yrs             | 11.6 | 43.1yrs               | 11.9 | 1.52                          | ns   |
| Education level                    |             |      |                     |      |                       |      |                               |
| High school and below              | 10          | 12.5 | 4                   | 10.5 | 6                     | 14.3 | 2.60(2)                       | ns   |
| College                            | 53          | 66.3 | 23                  | 60.5 | 30                    | 71.4 |                               |      |
| Graduate school                    | 17          | 21.3 | 11                  | 28.9 | 6                     | 14.3 |                               |      |
| Marital status                     |             |      |                     |      |                       |      |                               |
| Single                             | 22          | 27.5 | 9                   | 23.7 | 13                    | 31   | 3.55(3)                       | ns   |
| Married                            | 55          | 68.8 | 27                  | 71.1 | 28                    | 66.7 |                               |      |
| Divorced                           | 1           | 1.3  | 0                   | 0    | 1                     | 2.4  |                               |      |
| Cohabitation                       | 2           | 2.5  | 2                   | 5.3  | 0                     | 0    |                               |      |
| Respondent’s relationship with the patient |     |      |                     |      |                       |      |                               |
| Spouse                             | 15          | 18.8 | 6                   | 15.8 | 9                     | 21.4 | 8.92(6)                       | ns   |
| Parents                            | 26          | 32.5 | 10                  | 26.3 | 16                    | 38.1 |                               |      |
| Children                           | 18          | 22.5 | 12                  | 31.6 | 6                     | 14.3 |                               |      |
| Siblings                           | 3           | 3.8  | 3                   | 7.9  | 0                     | 0    |                               |      |
| Friends                            | 8           | 10   | 3                   | 7.9  | 5                     | 11.9 |                               |      |
| Self                               | 3           | 3.8  | 2                   | 5.3  | 1                     | 2.4  |                               |      |
| Unspecified                        | 7           | 8.8  | 2                   | 5.3  | 5                     | 11.9 |                               |      |
| Family monthly income              |             |      |                     |      |                       |      |                               |
| USD 0 ~ 1,011                      | 7           | 8.9  | 3                   | 8.1  | 4                     | 9.5  | 2.93(2)                       | ns   |
| USD 1,012 ~ 3,371                  | 39          | 49.4 | 22                  | 59.5 | 17                    | 40.5 |                               |      |
| USD 3,372 and above                | 33          | 41.8 | 12                  | 32.4 | 21                    | 50   |                               |      |
| Employment                         |             |      |                     |      |                       |      |                               |
| Unemployed                         | 4           | 5    | 2                   | 5.2  | 2                     | 4.8  |                               |      |
| Retired                            | 12          | 15   | 6                   | 15.8 | 6                     | 14.3 | 0.04(2)                       | ns   |
| Yes                                | 64          | 80   | 30                  | 78.9 | 34                    | 80.9 |                               |      |
| Place of residence                 |             |      |                     |      |                       |      |                               |
| Taipei City                        | 32          | 40   | 16                  | 42.1 | 16                    | 38.1 | 0.148(2)                      | ns   |
| Outside Taipei City                | 46          | 57.5 | 21                  | 55.3 | 25                    | 59.5 |                               |      |
| Foreign countries                  | 2           | 2.5  | 1                   | 2.6  | 1                     | 2.4  |                               |      |
| Hospital ward                      |             |      |                     |      |                       |      |                               |
| ICU                                | 33          | 41.25| 24                  | 63.2 | 23                    | 54.8 | 0.58(1)                       | ns   |
| Internal/Surgical ward             | 47          | 58.75| 14                  | 36.8 | 19                    | 45.2 |                               |      |

Rounding differences to 100% are possible
Table 2  Gender Differences in Attitude Toward the Patient Autonomy Act (PAA) (Mean, SD)

| Attitude Items                                                                 | All (Mean, SD) | Men (Mean, SD) | Women (Mean, SD) | T-value | Cronbach’s α |
|--------------------------------------------------------------------------------|----------------|----------------|------------------|---------|--------------|
| **Factor 1: Sense of abandonment**                                              |                |                |                  |         | 0.79         |
| With the PAA, I am basically waiting to die.                                   | 1.83 (0.81)    | 2.05 (0.73)    | 1.62 (0.83)      | -2.47*  |              |
| With the PAA, I feel insecure about my medical treatments in the future.      | 2.29 (0.99)    | 2.45 (1.03)    | 2.14 (0.95)      | -1.37   |              |
| With the PAA, my quality of care will not be guaranteed.                      | 2.19 (0.86)    | 2.42 (0.83)    | 1.98 (0.84)      | -2.38*  |              |
| With the PAA, healthcare providers will no longer care for my medical conditions. | 1.88 (0.83)    | 2.03 (0.82)    | 1.74 (0.83)      | -1.56   |              |
| **Sum scores (5–20)**                                                         | 8.18 (2.73)    | 8.94 (2.46)    | 7.48 (2.81)      | -2.48*  |              |
| **Factor 2: Support for patient autonomy**                                     |                |                |                  |         | 0.74         |
| PAA can reduce the pressure on family members to make decisions.              | 4.06 (0.90)    | 3.89 (0.80)    | 4.21 (0.78)      | 1.81    |              |
| PAA can make how I wish to be medically treated to be respected.              | 4.30 (0.70)    | 4.05 (0.70)    | 4.52 (0.63)      | 3.17**  |              |
| **Sum scores (5–10)**                                                         | 8.36 (1.34)    | 7.94 (1.37)    | 8.74 (1.21)      | 2.74**  |              |
| **Factor 3: Collective good**                                                  |                |                |                  |         | 0.88         |
| With the PAA, futile medical care can be reduced.                             | 4.10 (0.88)    | 3.79 (0.91)    | 4.38 (0.76)      | 3.17**  |              |
| With the PAA, healthcare providers will be protected from lawsuits while treating me how I wish to be medically treated. | 4.19 (0.66)    | 3.92 (0.59)    | 4.43 (0.63)      | 3.72*** |              |
| With the PAA, waste in medical resources can be reduced.                      | 3.99 (0.89)    | 3.68 (0.96)    | 4.26 (0.73)      | 3.04**  |              |
| **Sum scores (5–15)**                                                         | 8.08 (1.07)    | 7.47 (1.74)    | 8.64 (1.41)      | 3.32**  |              |

1: The higher score, the stronger agreement with the statement
* P < 0.05; ** P < 0.01; *** P < 0.001

Regarding the intention to withhold LSTs for spouses, the hypothetical decisions men would make for themselves were consistent with those they would make for their spouses. However, the hypothetical decisions women would make for their spouses differed significantly from those they would make for themselves. The women were more likely to accept enteral tube feeding for their husbands than for themselves (self–spouse difference = 0.60, p = 0.05) and were more in favor of a tracheotomy for their husbands than for themselves in cases where survival appears unlikely without a ventilator (self–spouse difference = 0.48, p = 0.05). However, no significant gender differences in these self–spouse differences were observed.

Testing for the mediation effect

We examined whether men and women differ in their attitudes toward the PAA and whether their attitudes affect their intention to withhold LSTs for severe dementia (the mediation model). Table 4 presents the regression results ("a" in Fig. 1) for gender on the three factors derived from the attitude toward the PAA (serving as three mediators in testing for the mediation effect). The results revealed that, in comparison with the women's scores, the men's scores were 1.55 higher for regarding the PAA as promoting a sense of abandonment (95% CI = 0.31, 2.80), 0.75 lower for supporting patient autonomy (95% CI = −1.38, −0.12), and 1.87 lower for contributing to the collective good (95% CI = −2.89, −0.84), when age, education, and marital status were controlled. None of the control variables were significantly associated with attitude toward the PAA.

Table 5 presents the regression results ("b," "c," and "ab" in Fig. 1). The direct effect of gender on the intention to withhold LSTs for severe dementia were fully mediated through the three factors of attitude toward the PAA, respectively. The indirect effect ("ab" in Fig. 1) of gender through the factor of regarding the PAA as promoting a sense of abandonment (Mediator 1) of the intention to withhold LSTs was −0.77 (95% CI = −1.96, −0.034), and that through the factor of supporting patient autonomy (Mediator 2) is −0.91 (95% CI = −1.96, −0.09), and that through the factor of contributing to the collective good (Mediator 3) was −1.65 (95% CI = −2.99, −0.52). These findings suggest that in comparison with the women, the men were significantly less likely to withhold LSTs involving severe dementia (the total effect ["c" + "ab" in Fig. 1] of gender was −3.37 [95% CI = −5.90, −0.85]).

As indicated in Table 5, the different aspects of attitude toward the PAA had distinct effects on the intention to withhold LSTs for severe dementia ("b" in Fig. 1). Regarding the PAA as promoting a sense of
Table 3  Gender Differences in the Intention to Withhold LSTs involving Severe Dementia for Self and Self-others Differences (Mean, SD)

| LSTs to be withheld                  | Self          |               | Self-parent differences² |               | Self-spouse differences² |
|--------------------------------------|---------------|---------------|--------------------------|---------------|--------------------------|
|                                      | Men (N = 38)  | Women (N = 42)| Independent two-sample t-test¹ | Men (N = 18)  | Women (N = 24)            | Men (N = 15)   | Women (N = 14)            |
| Enteral tube feeding as a means of ingesting food | 2.78 (1.17)   | 3.36 (1.43)   | p = 0.05                 | 0.67 (1.19)*  | 0.54 (1.06)*              | 0.50 (1.02)    | 0.60 (0.99)*              |
| Dialysis if have kidney failure      | 2.66 (1.19)   | 3.43 (1.36)   | p = 0.01                 | 0.60 (0.70)** | 0.50 (0.78)**             | ns (0.83)      | ns (1.05)                 |
| To be intubated and utilizing a ventilator to breathe | 3.23 (2.10)   | 3.90 (1.30)   | p = 0.02                 | 0.72 (1.02)** | 0.75 (1.03)**             | ns (0.83)      | ns (1.01)                 |
| Undergo a tracheotomy if being intubated for a month and survival is not possible without a ventilator | 3.50 (1.08)   | 4.12 (1.19)   | p = 0.01                 | 0.28 (0.75)   | 0.33 (0.64)*              | ns (0.73)      | ns (0.74)*                |
| Undergo cardiopulmonary resuscitation if a cardiac arrest | 3.65 (1.07)   | 4.07 (1.18)   | ns                       | 0.50 (0.79)** | 0.08 (0.58)               | p = -0.07      | -0.33 (0.05)              |
| Total scores                         | 15.84 (4.91)  | 18.88 (5.60)  | p = 0.01                 | -             | -                         | -             | -                        |

1 Independent two-sample t-test was used to test gender differences
2 Pair-sample t-tests were used to test self-other differences by gender, and independent two-sample t-tests were used to test gender differences in self-other differences

* p < 0.05; ** p < 0.01; *** p < 0.001

Table 4  Mediators as Outcome Variables: The Gender Effect on the Attitude Toward Patient Autonomy Act (PAA)

| Variables                  | Sense of abandonment | Support for patient autonomy | Collective good |
|----------------------------|-----------------------|-----------------------------|-----------------|
| Gender (ref: Women)        | B         | SE     | 95% CI    | B         | SE     | 95% CI    | B         | SE     | 95% CI    |
| Men                       | 1.55      | 0.63   | (0.31, 2.80)* | -0.75     | 0.3    | (-1.34, -0.16)* | -1.77     | 0.48   | (-2.73, -0.81)** |
| Control variables          |           |       |           |           |       |           |           |       |           |
| Age                       | 0.001     | 0.03   | (-0.06, 0.06) | -0.01     | 0.02   | (-0.05, 0.02) | 0.01      | 0.02   | (-0.04, 0.05) |
| Education                 | -1.35     | 1.22   | (-3.77, 1.07) | 0.21      | 0.42   | (-0.48, 1.32) | 1.08      | 0.73   | (-3.83, 2.54) |
| Married                   | -0.78     | 0.67   | (-2.11, 0.56) | 0.06      | 0.37   | (-0.69, 0.80) | 0.69      | 0.66   | (-0.62, 1.99) |
| Constant                  | 9.12      | 1.58   | (5.98, 12.26) | 8.94      | 0.96   | (7.02, 10.85) | 11.48     | 1.4    | (8.70, 14.26) |
| Model R²                  | 0.11      | 0.11   |              | 0.01      | 0.19   |              |           |       |           |

* p < 0.05; ** p < 0.01; *** p < 0.001

abandonment reduced the intention to withhold LSTs for severe dementia (−0.53, 95% CI = −0.99, −0.01); however, regarding the PAA as supporting patient autonomy (1.52, 95% CI = 0.37, 2.69) and as contributing to the collective good increased the intention to withhold LSTs for severe dementia (1.1, 95% CI = 0.44, 1.76).

Discussion

The results reveal that men tend to perceive the PAA and the signing of ADs as the abandonment of patients. In contrast, women tend to have more positive attitudes toward the PAA and view the PAA as supporting patient autonomy and contributing to the collective good. Men were generally less likely to withhold LSTs for severe dementia than women. However, the gender differences in the intention to withhold LSTs for severe dementia were fully mediated by differences in attitude toward the PAA between genders. This study contributes to the literature by exploring the disparity in how men and women perceive the PAA, an innovative piece of legislation in Taiwan that addresses a topic that generally receives little attention in Asian countries.

It may be easy to understand that people choose not to receive LSTs when the survival period is very short. According to a study by Tang et al. in Taiwan in 2014, among 2452 terminal cancer patients, when they knew the prognosis, they were less likely to choose life-prolonging medical treatment[52]. Yet, when the survival period may last several years, such as dementia, whether to withhold LSTs to shorten life will reflect more on people's value concerning what is meant by the quality of life. For example, patients with severe dementia rely on...
life-supporting devices and other people for daily nutrition and hygiene, resulting in severely impaired quality of life and poor dignity. Ultimately, attitudes toward patient autonomy and associated ideas such as the quality of life may determine LST-related decisions in real situations.

This study found that women were hesitant to agree to LSTs for severe dementia if these treatments were perceived to be futile. Moreover, women felt empowered because they believed that ADs can prevent unwanted life support and that healthcare practitioners would honor their ADs, consistent with the results from Perkins et al. [21]. By contrast, men felt disempowered and feared harm from the healthcare system. A recent review of studies conducted in China indicated that unfamiliarity with the concept of advance care planning and ADs is the main reason for people’s reluctance to complete an AD [53].

Furthermore, although both the women and men in this study generally agreed to more LSTs for their parents than for themselves, this tendency was stronger among the men, who were more likely than women to agree to CPR for their parents even if their hearts stopped because of end-stage dementia. However, when the men were making hypothetical decisions on behalf of their spouses, the self–other differences disappeared; that is, the men made the same decisions for themselves and their spouses. By contrast, the women’s hypothetical LST decisions exhibited self–spouse differences: they were more likely to agree to tube feeding and tracheotomy for their husbands than for themselves. Because of the small sample size, no significant gender differences in self–spouse differences were observed in the intention to withhold LSTs for severe dementia.

These findings can be situated among the relevant literature on self–other differences [27, 54]. The risk-as-feelings theory holds that subjective risk preferences are attenuated in surrogate decisions [55]; when people make decisions on behalf of others, they are less influenced by their interpretation of the risks involved. Other biasing factors, such as social norms, can determine individuals’ choices on behalf of others. When sons or daughters act as surrogate decision-makers for their parents of advanced age, they may place more weight on social norms than on the risk of compromising their parents’ quality of life. We speculate that the hypothetical LST decisions that adult children make for their parents are affected by the principle of filial piety emphasized in Asian societies. As a result, the respondents in the present study indicated that they would agree to more hypothetical LSTs for their parents than for themselves in cases where the patient’s quality of life would be severely affected because of end-stage dementia.

The integrated model of surrogate decision-making proposed by Tunney and Ziegler [29] may also help elucidate intergeneration and gender differences in surrogate decisions in cases where a patient’s quality of life is highly compromised because of severe dementia. According to that model, the surrogate decision-maker may consider what is in the recipient’s best interest (benevolent perspective), what they would do if they were the recipient (projected perspective), what they believe the recipient would choose (simulated perspective), and what serves their interests irrespective of the recipient’s wishes (ego-centric perspective). Familiarity [29] and closeness [27] with the recipient affect people’s ability to engage in simulated perspective-taking. Most Taiwanese families are still strongly influenced by patriarchy and traditional

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**Table 5** Mediation Models: The Direct, Indirect, and Total Effect of Gender (X) on the Intention to Withhold LSTs (Y) involving Severe Dementia

|                           | Model 1 (Mediator 1) | Model 2 (Mediator 2) | Model 3 (Mediator 3) |
|---------------------------|---------------------|---------------------|---------------------|
|                           | B       | SE     | 95% CI   | B       | SE     | 95% CI   | B       | SE     | 95% CI   |
| Gender (X) effect         |         |        |          |         |        |          |         |        |          |
| Direct effect of X on Y   | -2.6    | 1.36   | (-5.30, 0.10) | -2.46   | 1.38   | (-5.21, 0.28) | -1.73   | 1.42   | (-4.56, 1.11) |
| Indirect effect of through M on Y | -0.77 | 0.51   | (-1.96, -0.034)* | -0.91 | 0.49   | (-1.96, -0.09)* | -1.65   | 0.63   | (-2.99, -0.52)* |
| Total Effect of X on Y    | -3.37   | 1.27   | (-5.90, -0.35)* | -3.37   | 1.27   | (-5.90, -0.85)* | -3.37   | 1.27   | (-5.90, -0.85)* |
| Mediators                 |         |        |          |         |        |          |         |        |          |
| Sense of abandonment      | -0.53   | 0.25   | (-0.99, -0.01)* |         |        |          |         |        |          |
| Support for autonomy      |         |        |          | 1.52    | 0.58   | (0.367, 2.687)* |         |        |          |
| Collective good           |         |        |          |         |        |          | 1.1     | 0.33   | (0.44, 1.76)** |
| Control variables         |         |        |          |         |        |          |         |        |          |
| Age                       | 0.06    | 0.07   | (-0.07, 0.19) | 0.08    | 0.06   | (-0.05, 0.20) | 0.05    | 0.06   | (-0.10, 0.18) |
| Education                 | 0.18    | 0.27   | (-1.51, 0.51) | 0.34    | 0.23   | (-1.41, 0.50) | -0.16   | 0.28   | (-0.07, 0.18) |
| Married                   | 1.07    | 1.45   | (-1.83, 3.97) | 1.39    | 1.49   | (-1.59, 4.37) | 0.82    | 1.46   | (-2.09, 3.72) |
| Constant                  | 19.16   | 4      | (11.19, 27.13) | 3.87    | 4.91   | (-5.90, 13.64) | 3.94    | 4.06   | (-4.21, 12.09) |
| Model R2                  | 0.18    | 0.2    |           |         |        |          | 0.2     | 0.24   |           |

* p < 0.05; ** p < 0.01; *** p < 0.001
social hierarchies; surrogate decisions made by adult children on behalf of their parents or by women on their spouses are expected to be different from those made for themselves. Therefore, when people make decisions on behalf of others, they tend to be less influenced by the interpretation of risks involved and more influenced by other biasing factors, such as patriarchal principles and socialized gender roles. Several studies using health insurance claims data in Taiwan found that men, as fathers and husbands, are more likely than women to receive aggressive EOL care even at the end stage of terminal cancer [12, 13].

The current study provides a new perspective on how socialized gender roles affect the intention to withhold LSTs involving severe dementia. However, some limitations are noted. First, the sample is not representative because we adopted a single-center design with convenience sampling. Second, the questions regarding attitudes toward the PAA and the hypothetical scenarios involving severe dementia in the questionnaire were developed specifically for this study; a more extensive survey must be conducted to validate the questionnaire. Third, the answers to the questionnaire may be affected by the patients' conditions on the respondents' attitudes toward the PAA. Last, the small sample size call for caution in the findings.

Conclusion
The men in this study tended to perceive the PAA as a sign that patients are being abandoned by the health system and exhibited less interest than the women in regarding the PAA as a collective good and a means of protecting patient autonomy. Gender differences in the intention to withhold LSTs were fully mediated by their attitude toward the PAA. Both men and women were more likely to withhold LSTs for themselves than for their family members. Men were also more likely to agree to CPR for their parents than themselves, even if a cardiac arrest because of end-stage dementia, compared with what women would do for their parents.

Finally, women were more likely to agree to enteral tube feeding and a tracheotomy for their husbands than for themselves. In contrast, men made consistent decisions for themselves and their spouses for these LST scenarios. The study results indicate that socialized gender roles may play a critical role in EOL decisions in Taiwanese society. Because people still rely on family members to make LST decisions in real-life situations, patient education and public support for patient autonomy should be strengthened, especially in Asian countries.

Abbreviations
PAA  Patient Autonomy Act.
ADs  Advance Directives.

CPR  Cardiopulmonary Resuscitation.
DGABAS  Directorate-General of Budget, Accounting, and Statistics.
DNR  Do-Not-Resuscitate.
EOL  End-of-Life.
ICU  Intensive Care Unit.
LSPQ  Life Support Prevalence Questionnaire.
LSTs  Life-Sustaining Treatments.

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Authors' contributions
All authors meet the criteria for authorship defined by the International Committee of Medical Journal Editors and approved the final version of this manuscript for submission. DRC designed the study, analyzed the data, and drafted the manuscript. JSL, FCT, and YY revised the manuscript. All authors reviewed and approved this manuscript.

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All the participants provided written informed consent to participate in this study. This study was performed by the Declaration of Helsinki and approved by the National Taiwan University Research Ethics Committee (No. 201811035RINB).

Consent for publication
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