# Prevalence and correlates of abuse screening items among community-dwelling Hong Kong Chinese older adults

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## Abstract

### Aim

This study aims to describe the prevalence of potential elder abuse, and to examine correlates of abuse screening items among Chinese community-dwelling older adults.

### Methods

We analyzed the data of 3,435 older persons aged ≥60 who had first applied for the long term care services in Hong Kong and completed the screening tool (Minimum Data Set–Home Care) in 2006. For each of the five abuse screening items ('fearful of a family member/caregiver', 'unexplained injuries/broken bones/burns', 'physically restrained', 'unusually poor hygiene', and 'neglected/abused/mistreated'), we examined its relationship with four types of factors: older person, perpetrator, relationship and environment.

### Results

The rates of individual abuse screening items ranged from 3.9% for physically restrained to 0.03% for unexplained injures/broken bones/burns. Physically restrained was positively associated with ADL impairments, IADL impairments, perceived poor health, physically abusive behavior and caregiver mental health. Unusually poor hygiene was positively associated with socially inappropriate behavior and actively resisted care. Fearful of a family member/caregiver was positively associated with perceived poor health, conflicting relationship, and mental health and negatively with care activities. Neglected/abused/mistreated was positively associated with age and informal care, and negatively with care activities.

### Conclusions

We identified a number of associated factors of different abuse screening items among older adults. Our findings could inform healthcare practitioners in identifying those older persons who may be at higher risk of abuse, and provide a knowledge base upon which to develop effective preventive measures in the Chinese population.


*Keywords*: aged, Chinese, community-dwelling, elder abuse, screening item.

## Introduction

Elder abuse is a growing concern for governments and health service providers.[1] Defined as "intentional actions that cause harm or create a serious risk of harm (whether or not harm is intended) to a vulnerable elder by a caregiver or other person who stands in a trust relationship to the elder or; failure by a caregiver to satisfy the elder's basic needs or to protect the elder from harm" (p.3), elder abuse usually covers a range of dimensions including physical, sexual, psychological or emotional abuse, neglect, financial abuse and abandonment.[2] A systematic review reported that 6% of the older people in the community are likely being involved in significant abuse, although the estimates showed a great variation ranging from 3.2 to 27.5%.[3]

It is widely recognised that elder abuse carries serious consequences for the wellbeing of older adults. Empirical studies reported that abused elder victims had increased morbidity and mortality risks;[4] persistent physical pain and soreness, sleep disturbances and increased susceptibility to new illnesses;[5-6] high prevalence of depression;[7] aggravated psychological distress;[8] and increased fear, anxiety, and feelings of powerlessness and unworthiness.[9] Fulmer (2004) asserts that early detection and intervention can help to decrease morbidity and mortality in elder abuse cases.[10]

Like many other countries, Hong Kong is aging unprecedentedly rapid. It is projected that the proportion of population aged 65 and above will shoot up markedly from 13% in 2011 to 30% in 2041.[11] Moreover, Hong Kong's aging is taking place in the context of extensive social and economic changes[1] and these changes provide the backdrop in which elder abuse may not only occur but could also escalate without preventions and/or early interventions. And reckoning potential risk factors is the key to the implementation of aptly and timely interventions against elder abuse. A recent systematic review of risk factors of elder abuse in the community concluded that 13 risk factors were being consistently reported across a range of settings.[12] Adapting the ecological model advocated by Schiamberg and Gans,[13] the systematic review classified these risk factors into four domains including: factors related to the elder person (cognitive impairment, behavioural problems, psychiatric illness or psychological problems, functional dependency, poor physical health or frailty, low income or wealth, trauma or past abuse and ethnicity), factors related to the perpetrator (i.e. caregiver) (caregiver burden or stress, and psychiatric illness or psychological problems), factors related relationship between the elder person and caregiver (family disharmony, poor or conflictual relationship) and factors related to the environment (low social support and living with

others). On the other hand, previous studies also reported different factors were associated with subtypes of abuse among older adults. For example, Yan and Tang (2004)[14] identified that older person's visual ability and memory were negatively associated with verbal abuse but not with physical abuse in a Chinese sample. Garre-Olmo et al (2009)[15] also reported that depressive symptoms and bladder incontinence were associated with psychosocial abuse, widowhood and cognitive functioning associated with financial abuse while living arrangement and access to a trusted person associated with neglect in a Spain sample. Thus, it is important to examine the relative importance of these factors in relations to the different forms of elder abuse. The present study intends to fill this knowledge gap.

It has been rightly argued that elder abuse has been under-examined in Asia although there is voluminous literature in the area.[16] To a certain extent, this has to do with the operational nature of elder abuse. More often than not, elder abuse takes place within a contextual situation in terms of personal values, inter-reactions with caregivers and the living environment. As complex as it is, Cohen and colleagues (2007)[17] reasoned that there is no single assessment method is the best; and any assessment lacking the related biopsychosocial context will suffer significant limitations.

The present study aimed to describe the prevalence of potential elder abuse and explore possible associated factors of different forms of abuse screening items using the four domains suggested in Schiamberg and Gans' ecological model – older person, perpetrators, relationship, and environment, in a sample of community-dwelling Hong Kong Chinese older adults. The findings should generate important and culturally specific information that will enable healthcare professionals to identify older adults at risk for abuse more easily, and to develop effective measures for early prevention.

## Methods

*Data*

The present study used data from applicants who had applied for long-term care services in Hong Kong in 2006. The long-term care in Hong Kong is a need-based service and there are no financial restrictions attached. The applicants were required to complete a mandated screening instrument, the validated Hong Kong-Chinese version of the Minimum Data Set - Home Care version 2.0 (MDS-HC2.0) since 2003[18,19] Trained assessors who were professionals from various disciplines collected data using the MDS-HC2.0 by direct questioning of the client and the primary caregiver, and supplemented with observation and

review of secondary documents if necessary to collect information of the client.[20] As a mechanism of quality assurance, all the assessors had completed a 5-day training workshop on the use of the MDS-HC assessment tool and accredited by Department of Social Welfare of the Government of Hong Kong Special Administration Region. The MDS-HC2.0 is a multidimensional assessment instrument which provides a wide-ranging assessment of the mental and physical health of the clients.

A total of 10,331 clients had completed the MDS-HC2.0 in 2006. The current analysis used 3,435 participants aged 60 or more, who did not have prior/current long-term care support or a domestic helper, lived in their private home and had an informal caregiver. Respondents who were younger than 60 years (n=88) and receiving some form of long term care support either from the Government or domestic helpers at the time of assessment (n=6,808) were excluded from the analysis. Based on the ecological model,[13] we included measures on 28 variables that provide information on potential abuse, demographic characteristics and four factor domains (the older person, perpetrator, relationship and environment) in the present study. Ethical approval of this secondary data analysis was granted by the research ethics committee of University of Hong Kong.

*Outcome variables*

Potential elder abuse was assessed by using five screening items 'fearful of a family member or caregiver', 'unexplained injuries, broken bones or burns', 'physically restrained', 'unusually poor hygiene', and 'neglected, abused, or mistreated'.[21,22] Participants were asked to indicate whether the five items were applied to them. A positive answer to any of the five items was considered as potential elder abuse.

*Demographic variables*

We included four demographic variables in the study. Age was a continuous variable while gender, educational level (no formal education) and marital status (married) were dichotomous variables.

*Older person factors*

Fourteen older person factors were included in the study. Cognitive impairment was measured using the validated 5-item hierarchical MDS Cognitive Performance Scale (CPS).[23] The CPS ranges from 0 to 6 with a higher score indicating more severe cognitive impairment. Negative mood was measured by the validated 9-item Negative Mood Scale.[24] Physical

functioning was measured by both activities of daily living (ADLs) and instrumental activities of daily living (IADLs). The eight ADL measures for mobility in bed, transfer, locomotion, dressing, eating, toiler use, personal hygiene and bathing while the seven IADL measures for meal preparation, ordinary housework, managing finances, managing medication, phone use, shopping and transportation were included. The hierarchy ADL (range: 0-10) and the IADL (range: 0-21) scores were calculated, with higher scores indicating greater dependence on both.[25] Cronbach's alpha values were 0.644 for CPS, 0.659 for negative mood, 0.765 for ADL, and 0.706 for IADL respectively in the current study.

Perceived poor health was assessed using one item by asking the elder to indicate whether they felt having poor health. Four dichotomous behavioural measures of proactive or abusive behaviour exhibited in the prior 3 days by the elder person were included: physically abusive, verbally abusive, socially inappropriate behaviours, and active resistance of care. Excess alcohol consumption was measured by one item on whether others had expressed concern about the elder's drinking during the past 90 days. The presence or absence of four types of diseases including stroke, Alzheimer's disease, dementia other than Alzheimer's disease, and any psychiatric illness were included.

*Perpetrator factors*

Four perpetrator factors in the MDS-HC2.0 were included in the analysis. Informal support was measured by 'whether the primary caregiver is not satisfied with support received from family/friend' and caregiver mental health by 'the primary caregiver expresses feelings of distress/anger/depression' respectively. Care activities was created by counting the support the older person received in three aspects (advice/emotional support, help with IADL care, and help with ADL care) from their primary caregiver. Care activities can range from 0 to 3 with higher scores indicating the receipt of more support. Primary caregiver's relationship with the older person (e.g. spouse, child/child in-law/grandchild, other relatives, or friends/neighbours) was also used in the analysis.

*Relationship factors*

Older person's perception of difficulty with interpersonal interaction, conflicting relationship and feeling lonely, were included in the study by asking the respondents to indicate whether they were not at ease interacting with others, had openly expressed conflicts or anger with family/friends, and felt lonely respectively. These three variables were dichotomous.

*Environmental factors*

Social support and living conditions were included in the study. Social support was measured by asking the respondents to indicate whether their secondary caregivers would be 'willing to increase their care in terms of emotional support, ADL and IADL care if needed'. Social support was then created by counting the total number of support the client received from the secondary caregiver, and which can range from 0 to 3 with higher scores indicating more social support. Living condition was assessed by whether the older person lived with their primary caregiver (dichotomous variable).

*Data analysis*

Descriptive analyses summarized demographic and potential associated factors. For each of the screening items, bivariate and multivariate analyses identified factors associated with potential abuse. In the bivariate analyses, relationships of potential associated factors with potential abuse were assessed by t-tests or chi-square tests. Variables with a p-value < 0.1 in the bivariate analyses were included in the logistic regression model to assess the separate contributions of the independent variables in the model. The statistical package SPSS version 20.0 for Windows was used for data analysis.

## Results

Table 1 shows respondents' demographic characteristics, information of the four domains of factors and abuse screening items of the 3435 respondents. The average age was 79.7 years (SD = 7.4); 60.6% were female, 43.1% were married and 42.8% had some formal education. A total of 186 (5.4%, 95% CI: 4.6%-6.1%) had at least one of the five signs of potential abuse: 133 (3.9%) had physical restraint, 24 (0.7%) were in poor hygiene, 21 (0.6%) were fearful of their family, 12 (0.3%) were neglected, abused, or mistreated, and 1 (0.03%) had unexplained injures, broken bones or burns. Since the rate of the screening item on 'unexplained injures, broken bones or burns' was very low, no further analyses were conducted for this item because the results on parameter estimates in logistic regression would be unstable.

Table 2 shows the results of bivariate and multivariate analyses for the abuse screening item 'fearful of a family member or caregiver'. Eleven factors were found to be associated with this screening item with p-value < 0.1 and hence were included in the final logistic regression. Logistic regression results showed that five of the 11 factors including one older

person factor (perceived poor health (OR: 3.56; 95% CI: 1.31-9.69)), three perpetrator factors (caregiver's mental health (OR: 4.82; 95% CI: 1.67-13.91), care activities (OR: 0.32; 95% CI: 0.18-0.56), primary caregiver was the spouse (OR: 0.07; 95% CI: 0.007-0.74)) and one relationship factor (conflicting relationship (OR: 7.01; 95% CI: 2.52-19.46)) were significant independent associated factors of fearful of a family member or caregiver. The Nagelkerke $R^2$ for the logistic regression model was 0.314.

Table 3 presents the bivariate and multivariate results for physically restrained. Among the nine factors at p-value < 0.1 in the bivariate analyses, five of them were positively and significantly associated with physically restrained in the logistic regression: four older person factors (ADL impairments (OR: 2.43; 95% CI: 2.06-2.85), IADL impairments (OR: 1.14; 95% CI: 1.06-1.22), perceived poor health (OR: 1.89; 95% CI: 1.24-2.89), and physical abusive behavior (OR: 3.17; 95% CI: 1.11-9.07)) and one perpetrator factor (caregiver mental health (OR: 1.66; 95% CI: 1.11-2.50)). The Nagelkerke $R^2$ for the logistic regression model was 0.341.

Results for the screening item 'usually poor hygiene' were presented in Table 4. Five factors with four older person factors (cognitive impairment, ADL impairments, socially inappropriate behavior, and actively resisted care) and one environmental factor (not lived with primary caregiver) had p-values < 0.1 in the bivariate analyses, and included in the logistic regression model. Logistic regression results shows that only two older person factors were positively and significantly associated with 'usually poor hygiene' and they were socially inappropriate behavior (OR: 3.07; 95% CI: 1.04-9.03) and actively resisted care (OR: 12.23; 95% CI: 4.63-32.27). The Nagelkerke $R^2$ for the logistic regression model was 0.162.

Data of the bivariate and multivariate analyses for the screening item 'neglected, abused, or mistreated' are presented in Table 5. In the bivariate analyses, one demographic factor (age), two older person factors (ADL impairments and IADL impairments), two perpetrator factors (Informal support and care activities) and one relationship factor (conflicting relationship) had p-values < 0.1. These six factors were entered in the logistic regression as independent factors. The results reveals that three remained statistically significant: age (OR: 1.10; 95% CI: 1.01-1.20) and informal support (OR: 5.29; 95% CI: 1.35-20.78) were positively while care activities was negatively associated with the likelihood of being neglected, abused, and mistreated. The Nagelkerke $R^2$ for the logistic regression model was 0.135.

**Discussion**

The prevalence of potential abuse in the present study was comparable to that in the older general population (6%),[3] but was much lower than that reported in previous similar studies in Hong Kong (> 20%).[9,14,26] As compared with these local studies, the difference in the prevalence could be explained by the measurement tools of abuse that verbal abuse, a relatively milder but more common form of abuse, was included in all these local studies[9,14,26] but not in the present study. Furthermore, financial abuse was not measured therefore the prevalence of potential elder abuse is probably underestimated in the present sample. At the item level, in line with previous studies in Asia countries based on government or nongovernmental organizations data,[16] the findings of the current study also reported that physically restrained (as one form of physical abuse) was the most prevalent subtype of potential abuse while other signs of potential abuse relating to psychosocial and neglect abuses were rarely reported.

In line with previous studies,[14,15] the current study also found distinct associated factors for the four signs of potential abuse. In particular, it was noted that more older person factors were associated with 'physically restrained' and 'unusually poor hygiene' while more perpetrator factors were associated with 'fearful of a family member or caregivers' and 'neglected, abused, or mistreated'. For example regarding the older person factors, mixed results regarding the relationship between physical health and abuse among older adults were reported from previous studies in Asian countries.[16] The current study demonstrated that impairments in ADL and IADL were positively associated with only one of the screening item 'physically restrained', but did not associate with the other three abuse screening items. Perceived poor health, on the other hand, was significantly associated with higher risk in both physically restrained and fearful of a family member or caregivers. Although several studies have found that older persons with behavioral disturbanceswere more likely to be abused by their caregivers, [27,28] physical abusive behaviors was associated with higher risk of physically restrained while socially inappropriate behaviors and actively resisted care were positively associated with only 'unusually poor hygiene' in the current study. The observation for the relationship between physical abusive behaviors and physically restrained is obvious as it is common believed that restraining the older person with physical abusive behaviors could reduce the chance of the older person being self-injured or hurt others. For relationships regarding unusually poor hygiene, it could be possible in the sense that it may be hard to provide care that needs body contact if the older person had those two types of behavioral disturbance. The current results demonstrated that different behavioral disturbance of the older persons were associated with different forms of potential abuse. Advanced age has been

reported as a protective factor against elder abuse in previous Asian and local studies.[14] The current study however found that increasing age was positively associated with a higher risk of being neglected, abused, or mistreated. The contradicting results might be due to the different characteristics of the studied subjects across studies. Following the argument by Yan and Chan,[26] respondents in the current study were those sought for long-term care service that the oldest old (> 80 years) were overrepresented (51.4%) in the sample while those studies recruited convenience samples in the community. Indeed, the review on community-dwelling elders also concluded that there was no clear trend in age as a risk factor of abuse,[12] suggesting further examination of risk factors of elder abuse should be stratified by whether the respondents were seeking for service or not.

For perpetrator factors, poor caregiver mental health was associated with increased risks of fearful of a family member or caregivers and physically restrained while a higher level of care activities was associated with lower risks of fearful of a family member or caregivers and neglected, abused, and mistreated respectively. On the other hand, higher risk of being neglected, abused, and mistreated was observed among older adults with their primary caregiver experienced a lower level of informal support. A previous study in Taiwan has also found a positive association in this sense.[29] Among the three relationship factors, only one significant relationship between conflicting relationship and fearful of a family member or caregivers was found in the current study, which was in line with the conclusion by the systematic review and extended to a Chinese context as few studies in the Asian region had examined the association between conflicting relationship and different forms of potential abuse.[14] Identification of the risk factors of potential abuse among Chinese older adults may provide directions for developing risk indexes for understanding risk prognostication for elder abuse in the Chinese population.[30] Our study suggests similar index could be developed for different forms of potential abuse. Based the study findings, a total of 26 items are required to measure the 12 associated factors of the four abuse screening items, ranging from 2 items for unusually poor hygiene to 19 items for physically restrained. Researchers could select the appropriate items of the corresponding associated factors of the types of potential abuse that are of interest. As a short instrument, it could be easily administered in a clinical or epidemiological setting.

The non-significance of environmental factors in the current study seemed to be contradicting to the literature as social support was consistently reported as an important factor of elder abuse in previous studies.[3,12] One potential explanation is that the social support measure in the current sample is not sensitive enough by only targeting the support

from secondary caregivers, and the association might therefore be underestimated in the current study. On the other hand, mixed results on the association have been reported in Chinese community samples. A local study has reported a significant negative association of social support,[26] but another study in Canada[31] showed that the significant association of social support disappeared after adjusting for health variables of the older person, reflecting social support might be related to abuse because of the association between health variables and abuse. More studies are needed to explore this assertion. For the living arrangement, not lived with primary caregiver was not a significant associated factor of all the four screening items although previous studies reported mixed results in the aspect.[12] Again, it might be possible that the use of this binary variable might not be sensitive enough to detect the relationship given that co-residing days with caregiver was found as a significant risk factor of both verbal and physical abuses in older Chinese patients with dementia.[32]

In our study, cognitive impairment, psychiatric illness and negative mood were not found to be significant associated factors for the four abuse screening items. Such findings are not surprising because nearly all the reported cases of signs of abuse were related to physical restrained in the current sample. A previous study had reported that cognitive impairment was only associated with the risk of financial abuse, but not with psychosocial or neglect abuse in a sample of people aged 75 and older in Spain.[15] This non-significant finding on cognitive impairment also echoes previous studies in the general older adult population and confirmed that the impact of cognitive impairment might have been diluted in the general population.[3] For psychiatric illness or psychological problems, previous studies had reported the presence of depressive symptoms or stressful condition was only associated with psychological abuse but other types of abuse.[15,26]

A practical implication which can be drawn from these results is their helpfulness in the identification of a profile for Chinese older adults who may be at risk of suffering abuse. Health practitioners should pay attention to older adults who may be at a higher risk of different forms of abuse. Based on the findings of the study, preventive strategies may provide education, support and early intervention for older adults who are dependent in ADL and IADL, perceived to be in a poor health, show signs of physical abusive behaviors, socially inappropriate behaviors and active resistance of care, express conflicts with family or friends, and express that their primary caregiver has the feelings of distress/anger/depression. The MDS-HC items could be used as a routine practice in identifying these targeted older persons who are at risk for support and early interventions. In addition, caregivers play a pivotal role in the care of older persons but caregiving can be a stressful event. Thus, it is

important to provide adequate support to caregivers in helping them to deal with stress and burden during the caregiving process. Caregivers who need support may be referred to interventions which could increase their self-efficacy in caregiving and reduce health risk behaviors.[33]

One of the strengths of the study was a comprehensive and robust method used for collecting information on potential elder abuse: self-, caregiver-, and assessor-report as well as document review, the triangulating process further enhances the reliability of the measure. In addition, the current study extended the findings from previous studies in the Chinese population by using a comprehensive list of potential associated factors with a large sample size, making the examination of their individual contribution to individual abuse screening item simultaneously in one sample possible.

The current study has several limitations. First, it was a cross-sectional investigation of associations between potential abuse and its potential risk factors. This limits the extent to which causal inferences of the observed associations can be established. Longitudinal studies to establish the temporal validity of any associations found are needed. Second, information of other factors including older person's financial condition and history of trauma exposure/past abuse; other forms of abuse like financial and verbal abuse and chemical restraint, caregiver's characteristics and psychological condition were not available in MDS-HC, which preclude us from examining their individual impacts on potential elder abuse. This may partly explain the limited explanatory power of the associated factors for abuse screening items in the current sample. Another limitation was the lack of reference time period of abuse screening items in the current study (lifetime versus past year prevalence) making it difficult to directly compare the current prevalence rate of potential elder abuse with previous studies. In addition, information regarding neglected, abused, or mistreated was collected using one item in MDS-HC even though these should be treated as three aspects of abuse. Additionally, the observed rates of each of the five screening items were very low which will affect the stability of the parameter estimates in the logistic regression models, and hence the results should be considered as preliminary findings and interpreted with caution. Some argue that the issue of elder abuse is somehow in the eyes of the beholders – one of the operational natures of elder abuse.[17] Due to its scope and study approach, the present study has not fully covered the subjectivity aspect of elder abuse, but rather, we examined the objective evidences. Finally, the current sample consisted solely of adults who were first-time applicants for long-term care services, so the current findings may not be generalizable to the larger older population in Hong Kong.

In conclusion, this study showed that the prevalence of having at least one form of five signs of abuse in Hong Kong Chinese older adults was 5.4%, with physically restrained the most prevalent sign of elder abuse. The current study extends research in elder abuse in the Chinese population by identifying important associated factors of abuse screening items including the characteristics of the elder person's (older, ADL and IADL impairments, perceived poor health, physical abusive behavior, socially inappropriate behavior and actively resisted care) and their caregivers (caregiver mental health, informal support and care activities) as well as their inter-relationship (conflicting relationship). The findings not only inform clinical practice regarding the profile of older adults who may be at a higher risk of suffering abuse, but also provide a knowledge base from which to develop interventional programs which should target the dyadic pair and the dyadic relationship to prevent elder abuse.

**Disclosure statement**

The authors declare that they have no competing interests.

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Table 1. Demographic characteristics and abuse screening among respondents (N=3,435)

| **Variables** | Mean±SD or Freq (%) |
|---|---|
| **Demographic variables** | |
| Age | 79.70±7.43 |
| Female | 2081 (60.6%) |
| Had some formal school | 1496 (42.8%) |
| Married | 1480 (43.1%) |
| **Abuse Screening item** | |
| Fearful of a family member or caregivers | 21 (0.6%) |
| Unexplained injures, broken bones or burns | 1 (0.03%) |
| Physically restrained | 133 (3.9%) |
| Unusually poor hygiene | 24 (0.7%) |
| Neglected, abused, or mistreated | 12 (0.3%) |
| At least one of the five screening items | 186 (5.4%) |

Table 2. Results of bivariate and multivariate analysis for the abuse screening item 'fearful of a family member or caregiver'

| | Bivariate analysis | | | Multivariate analysis | |
|---|---|---|---|---|---|
| | Present (n =21) | Absent (n = 3414) | p-value | Adjusted Odds Ratio (95% CI) | p-value |
| **Demographic variables** | | | | | |
| Age | 80.76±6.99 | 79.69±7.43 | 0.510 | | |
| Female | 16 (76.2%) | 2065 (61.5%) | 0.180 | | |
| Had some formal school | 12 (57.1%) | 1457 (42.7%) | 0.192 | | |
| Married | 6 (28.6%) | 1474 (43.2%) | 0.193 | | |
| **Older person factors** | | | | | |
| Cognitive impairment | 1.43±0.68 | 1.49±0.91 | 0.756 | | |
| Negative mood | 2.10±2.14 | 0.87±1.47 | 0.017 | 1.04 (0.85-1.27) | 0.720 |
| ADL impairments | 0.05±0.22 | 0.63±1.04 | <0.001 | 0.05 (0.00-26.77) | 0.341 |
| IADL impairments | 8.33±5.42 | 13.42±5.79 | <0.001 | 0.96 (0.87-1.05) | 0.370 |
| Perceived poor health | 15 (71.4%) | 1176 (34.4%) | 0.001 | **3.56 (1.31-9.69)** | **0.013** |
| Verbally abusive behavior | 2 (9.5%) | 126 (3.7%) | 0.183 | | |
| Physical abusive behavior | 0 (0%) | 37 (1.1%) | 1.000 | | |
| Socially inappropriate behavior | 0 (0%) | 160 (4.7%) | 0.622 | | |
| Actively resisted care | 1 (4.8%) | 106 (3.1%) | 0.487 | | |
| Excess alcohol consumption | 0 (0%) | 31 (0.9%) | 1.000 | | |
| Stroke | 5 (23.8%) | 1020 (29.9%) | 0.639 | | |
| Alzheimer's disease | 0 (0%) | 275 (8.1%) | 0.406 | | |
| Dementia other than Alzheimer's disease | 2 (9.5%) | 418 (12.2%) | 1.000 | | |

| | | | | | |
|---|---|---|---|---|---|
| Any psychiatric illness | 5 (23.8%) | 346 (10.1%) | 0.056 | 1.60 (0.51-5.00) | 0.421 |
| **Perpetrator factors** | | | | | |
| Caregiver mental health | 13 (61.9%) | 1128 (33.0%) | 0.009 | **4.82 (1.67-13.91)** | **0.004** |
| Informal support | 3 (14.3%) | 172 (5.0%) | 0.088 | 0.98 (0.23-4.17) | 0.976 |
| Care activities | 1.08±0.93 | 2.67±0.60 | <0.001 | **0.32 (0.18-0.56)** | **<0.001** |
| Primary caregiver's relationship with older person | | | 0.031 | | 0.083 |
| Child/child-in-law/grandchild | 16 (76.2%) | 1973 (57.8%) | | 0.64 (0.20-2.07) | 0.460 |
| Spouse | 1 (4.8%) | 1054 (30.9%) | | 0.17 (0.007-1.74) | 0.060 |
| Others | 4 (19.4%) | 387 (11.3%) | | 1 | |
| **Relationship factors** | | | | | |
| Difficulty with interpersonal interaction | 0 (0%) | 337 (9.9%) | 0.257 | | |
| Conflicting relationship | 8 (38.1%) | 219 (6.4%) | <0.001 | **7.01 (2.52-19.46)** | **<0.001** |
| Feeling lonely | 10 (47.6%) | 983 (28.8%) | 0.087 | 0.84 (0.31-2.26) | 0.732 |
| **Environmental factors** | | | | | |
| Social support | 0.56±1.13 | 0.47±0.88 | 0.776 | | |
| Not living with primary caregiver | 6 (16.7%) | 985 (28.9%) | 1.000 | | |
| | | | | Nagelkerke $R^2$ | 0.314 |

Table 3. Results of bivariate and multivariate analysis for the screening item 'physically restrained'

| | Bivariate analysis | | | Multivariate analysis | |
|---|---|---|---|---|---|
| | Present (n =133) | Absent (n = 3302) | p-value | Adjusted Odds Ratio (95% CI) | p-value |
| **Demographic variables** | | | | | |
| Age | 79.41±7.87 | 79.71±7.41 | 0.652 | | |
| Female | 78 | 2003 | 0.652 | | |
| Had some formal school | 58 | 1411 | 0.858 | | |
| Married | 61 | 1419 | 0.532 | | |
| **Older person factors** | | | | | |
| Cognitive impairment | 2.28±1.52 | 1.46±0.86 | <0.001 | 1.01 (0.85-1.20) | 0.947 |
| Negative mood | 0.79±1.45 | 0.88±1.48 | 0.466 | | |
| ADL impairments | 2.61±1.28 | 0.55±0.95 | <0.001 | **2.43 (2.06-2.85)** | **0.001** |
| IADL impairments | 18.51±2.24 | 13.18±5.80 | <0.001 | **1.14 (1.06-1.22)** | **0.001** |
| Perceived poor health | 61 | 1103 | 0.007 | **1.89 (1.24-2.89)** | **0.003** |
| Verbally abusive behavior | 5 | 123 | 1.000 | | |
| Physical abusive behavior | 5 | 32 | 0.013 | **3.17 (1.11-9.07)** | **0.032** |
| Socially inappropriate behavior | 4 | 156 | 0.526 | | |
| Actively resisted care | 2 | 105 | 0.440 | | |
| Excess alcohol consumption | 0 | 31 | 0.632 | | |
| Stroke | 70 | 955 | <0.001 | 1.10 (0.73-1.65) | 0.653 |
| Alzheimer's disease | 8 | 267 | 0.513 | | |

| | | | | | |
|---|---|---|---|---|---|
| Dementia other than Alzheimer's disease | 23 | 397 | 0.078 | 1.05 (0.59-1.85) | 0.875 |
| Any psychiatric illness | 9 | 342 | 0.241 | | |
| **Perpetrator factors** | | | | | |
| Caregiver mental health | 73 | 1068 | <0.001 | **1.66 (1.11-2.50)** | **0.014** |
| Informal support | 5 | 170 | 0.685 | | |
| Care activities | 2.86±0. 83 | 2.65±0.61 | <0.001 | 1.07 (0.67-1.72) | 0.776 |
| Primary caregiver's relationship with older person | | | 0.278 | | |
| Child/child-in-law/grandchild | 69 | 1920 | | | |
| Spouse | 49 | 1006 | | | |
| Other relatives | 15 | 376 | | | |
| **Relationship factors** | | | | | |
| Difficulty with interpersonal interaction | 12 | 325 | 0.882 | | |
| Conflicting relationship | 7 | 220 | 0.720 | | |
| Feeling lonely | 30 | 963 | 0.118 | | |
| **Environmental factors** | | | | | |
| Social support | 0.47±0.88 | 0.47±0.88 | 0.985 | | |
| Not living with primary caregiver | 41 | 950 | 0.626 | | |
| | | | | Nagelkerke $R^2$ | 0.341 |

Table 4. Results of bivariate and multivariate analysis for the screening item ‘unusually poor hygiene’

| | Bivariate analysis | | | Multivariate analysis | |
|---|---|---|---|---|---|
| | Present (n =24) | Absent (n = 3411) | p-value | Adjusted Odds Ratio (95% CI) | p-value |
| **Demographic variables** | | | | | |
| Age | 78.72±7.20 | 79.70±7.43 | 0.517 | | |
| Female | 13 | 2068 | 0.535 | | |
| Had some formal school | 11 | 1458 | 0.837 | | |
| Married | 8 | 1472 | 0.410 | | |
| **Older person factors** | | | | | |
| Cognitive impairment | 1.88±1.19 | 1.49±0.90 | 0.037 | 1.57 (0.96-2.57) | 0.070 |
| Negative mood | 1.21±1.64 | 0.88±1.48 | 0.277 | | |
| ADL impairments | 0.33±0.64 | 0.63±1.04 | 0.034 | 0.58 (0.31-1.08) | 0.086 |
| IADL impairments | 12.25±4.75 | 13.39±5.81 | 0.335 | | |
| Perceived poor health | 11 | 1180 | 0.283 | | |
| Verbally abusive behavior | 1 | 127 | 0.599 | | |
| Physical abusive behavior | 0 | 37 | 1.000 | | |
| Socially inappropriate behavior | 6 | 154 | 0.001 | **3.07 (1.04-9.03)** | **0.042** |
| Actively resisted care | 9 | 98 | <0.001 | **12.23 (4.63-32.27)** | **<0.001** |
| Excess alcohol consumption | 0 | 31 | 1.000 | | |
| Stroke | 6 | 1019 | 0.823 | | |
| Alzheimer’s disease | 3 | 272 | 0.435 | | |
| Dementia other than Alzheimer’s disease | 5 | 415 | 0.204 | | |

| | | | | | |
|---|---|---|---|---|---|
| Any psychiatric illness | 1 | 350 | 0.505 | | |
| **Perpetrator factors** | | | | | |
| Caregiver mental health | 9 | 1132 | 0.667 | | |
| Informal support | 1 | 174 | 1.000 | | |
| Care activities | 2.42±0.76 | 2.66±0.61 | 0.135 | | |
| Primary caregiver's relationship with older person | | | 0.715 | | |
| Child/child-in-law/grandchild | 13 | 1976 | | | |
| Spouse | 7 | 1048 | | | |
| Other relatives | 4 | 387 | | | |
| **Relationship factors** | | | | | |
| Difficulty with interpersonal interaction | 4 | 333 | 0.287 | | |
| Conflicting relationship | 2 | 225 | 0.670 | | |
| Feeling lonely | 5 | 988 | 0.500 | | |
| **Environmental factors** | | | | | |
| Social support | 0.53±1.06 | 0.47±0.88 | 0.788 | | |
| Not living with primary caregiver | 11 | 980 | 0.073 | 2.25 (0.96-5.30) | 0.062 |
| | | | | Nagelkerke $R^2$ | 0.162 |

Table 5. Results of bivariate and multivariate analysis for the screening item ‘neglected, abused, or mistreated’

| | Bivariate analysis | | | Multivariate analysis | |
|---|---|---|---|---|---|
| | Present (n =12) | Absent (n = 3423) | p-value | Adjusted Odds Ratio (95% CI) | p-value |
| **Demographic variables** | | | | | |
| Age | 83.59±6.65 | 79.68±7.43 | 0.069 | **1.10 (1.01-1.20)** | **0.036** |
| Female | 8 | 2073 | 0.774 | | |
| Had some formal school | 6 | 1463 | 0.772 | | |
| Married | 5 | 1475 | 1.000 | | |
| **Older person factors** | | | | | |
| Cognitive impairment | 1.42±0.79 | 1.49±0.91 | 0.779 | | |
| Negative mood | 1.50±1.38 | 0.88±1.48 | 0.147 | | |
| ADL impairments | 0.25±0.62 | 0.63±1.04 | 0.060 | 0.84 (0.32-2.17) | 0.715 |
| IADL impairments | 10.00±5.67 | 13.40±5.80 | 0.043 | 0.95 (0.86-1.06) | 0.361 |
| Perceived poor health | 7 | 1184 | 0.125 | | |
| Verbally abusive behavior | 0 | 128 | 1.000 | | |
| Physical abusive behavior | 0 | 37 | 1.000 | | |
| Socially inappropriate behavior | 0 | 160 | 1.000 | | |
| Actively resisted care | 1 | 106 | 0.316 | | |
| Excess alcohol consumption | 0 | 31 | 1.000 | | |
| Stroke | 2 | 1023 | 0.528 | | |
| Alzheimer’s disease | 1 | 274 | 1.000 | | |
| Dementia other than Alzheimer’s disease | 1 | 419 | 1.000 | | |

| | | | | | |
|---|---|---|---|---|---|
| Any psychiatric illness | 2 | 349 | 0.351 | | |
| **Perpetrator factors** | | | | | |
| Caregiver mental health | 6 | 1135 | 0.230 | | |
| Informal support | 3 | 172 | 0.020 | **5.29 (1.35-20.78)** | **0.017** |
| Care activities | 2.08±0.79 | 2.66±0.61 | 0.001 | **0.43 (0.21-0.88)** | **0.021** |
| Primary caregiver's relationship with older person | | | 0.809 | | |
| Child/child-in-law/grandchild | 7 | 1982 | | | |
| Spouse | 3 | 1052 | | | |
| Other relatives | 2 | 389 | | | |
| **Relationship factors** | | | | | |
| Difficulty with interpersonal interaction | 2 | 335 | 0.332 | | |
| Conflicting relationship | 3 | 224 | 0.040 | 3.40 (0.86-13.47) | 0.081 |
| Feeling lonely | 4 | 989 | 0.753 | | |
| **Environmental factors** | | | | | |
| Social support | 0.50±0.76 | 0.47±0.88 | 0.929 | | |
| Not living with primary caregiver | 6 | 985 | 0.117 | | |
| | | | | Nagelkerke $R^2$ | 0.135 |