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Inactive residents living in nursing homes and associated predictors: findings from an Italian regional-based retrospective study

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Abstract

Objectives: It has been amply reported that nursing home (NH) residents are largely inactive, a condition which may further increase functional decline, behavioral disorders, and the risk of death. To date, studies have mainly focused on individual characteristics that may decrease residents' involvement in activities. Therefore, the aim of this study is to describe the prevalence of inactive NH residents in an Italian context, identifying predictors of inactivity at the individual and NH levels.

Design: Retrospective regional-based study performed in 2014.

Setting: All NHs (=105) located in the Friuli Venezia Giulia Region, North-East of Italy.

Participants: 8,875 residents with at least one nursing assessment and living in an NH for at least one year.

Measurements: The dependent variable was inactivity in the last week, defined as the resident not being involved in any socially-, individually- based, or meaningful recreational (e.g. gardening) activities. The independent variables were set at individual and NH levels. Aiming at identifying predictors of inactivity, a hierarchical generalized linear (mixed-effects) model incorporating both fixed-effect parameters and random effects, was performed.

Results: A total of 4,042 (45.6%) residents were inactive during the week before the evaluation. At the resident level, those with severe cognitive impairment (OR 4.462, 95% CI 3.880–5.132), unsociable behavior (OR 2.961, 95% CI 2.522–3.473), night restlessness (OR 1.605, 95% CI 1.395–1.853), lack of cooperation in daily care (OR 1.408, 95% CI 1.199–1.643), pressure sores (OR 1.314, 95% CI 1.065–1.622), depressive disorders (OR 1.242, 95% CI 1.089–1.416) and clinical instability (OR 1.110, 95% CI 1.037-1.188) reporting an increased risk of being inactive. At the NH level, for each additional hour of care offered by professional educators there was 1% less likelihood of inactive residents (OR .964, 95% .933-.996).

Conclusion: Around half of the residents in this study living in Italian NHs are inactive. Inactivity is significantly associated with the presence of severe cognitive impairment, of behavioral disorders, such as unsociability, night restlessness and lack of cooperation in daily care, pressure sores, depressive symptoms and clinical instability. Moreover, receiving care from professional educators, who have in their training and professional mission the aim of improving individual and social engagement, decreased the likelihood of resident inactivity.

Keywords

Inactivity, nursing home, leisure activities, predictors, residents, long-term residents, retrospective study, hierarchical generalized linear mixed-effects model

It has been widely reported that nursing home (NH) residents are largely inactive.[1-4] Gottesman and Bourestom[5] defined the concept of inactivity among NHs residents as the time spent doing nothing or engaging in passive activities, such as waiting, sleeping, and/or fidgeting. Several negative consequences have been documented among inactive NH residents, such as increased functional decline, increased behavioral disorders (e.g. agitation, apathy),[6] and depressive symptoms,[7] which may also increase nursing staff workloads.[4] In contrast, high levels of engagement in both individual (e.g., reading) and/or socially-based activities (e.g., group activities) have been associated with decreased agitation and psychotropic medications, increased resident quality of life[8-10] and satisfaction among resident families.[11]

In the first study available in the field conducted in the USA, Gottesman and Bourestom[5] reported that around 56% of the 1,144 NH residents included were inactive; around twenty years later, Nolan and colleagues[12] conducted an observational study on 49 residents in two different continuing care units in North Wales (UK), documenting that around 70% of them spent their time in passive activities. More recently, Edvardsson and colleagues[13] using a cross-sectional study, included 1,266 residents from 156 residential elderly care units in Sweden, reporting that the prevalence of inactivity among the residents in the previous week had ranged from 38% to 87% of the time. More recently, den Ouden and colleagues[4] observed 723 residents living in seven NHs in The Netherlands, documenting that between 45% to 77% of their time was spent doing little or nothing. The different occurrence of inactivity, usually expressed as the amount of time of the day doing nothing or engaging in passive activities, depends on the conceptual definition of inactivity adopted (e.g. including,[4] or not, watching television[5]) and on the measurement method used (e.g. questionnaire[13] or observation[5]).

Identifying predictors of resident inactivity offered by NHs has been the focus of several authors[6,14-18] who have identified to date mainly independent variables at the individual level. For example, a significant association between sensory (hearing, vision, communication),[17] cognitive

impairment[6,13,18] and resident inactivity has been documented. Moreover, some clinical conditions, such as depressive symptoms,[6,19] wandering behavior[10] and dementia[6,13,20] have been found to increase the occurrence of inactivity. However, to date, limited attention has been devoted to the role of NH level predictors of resident inactivity on a large scale[18] including in multi-level analysis NH-facility levels variables, in addition to individual factors.

NH features may help in understanding a psychosocial outcome such as social engagement expressed by activity participation.[18] Large NHs may have opportunities to offer organized social and recreational programs, while smaller facilities may be better at fostering close resident-staff relationships and friendships. Moreover, facilities with varying health care professionals possessing different competences may also vary in their capability to promote resident activity.[21]

Therefore, the general intent of the present study is to describe the occurrence of inactivity among residents living in NHs and identify predictors at the individual and NH levels.

METHODS

Design and setting

A retrospective, regionally-based study design involving all 105 NHs located in a North-Eastern region of Italy was performed in 2014.

Participants

All residents who had lived in a regional NH for at least one year, and who had received at least one nursing assessment, were included in the study. No exclusion criteria were established.

Study framework, dependent and independent variables

A study framework was designed and is shown in Figure 1.

Dependent variable

NH resident inactivity was the dependent variable. Residents were considered "inactive" when they were not involved in any socially-based (e.g. birthday parties, playing cards), individually-based recreational activity (watching TV, reading books/newspapers, sewing) or in both socially- and individually- based meaningful activities, such as those reflecting resident's preferences and favorite pastimes (e.g. gardening, participating in religious services).[22] The dependent variable data was extracted from the last assessment recorded in the regional database performed by trained Registered Nurses (RNs) through the Val.Graf tool[22] and measuring resident participation in the above-mentioned activities (yes/no) during the previous week.

Independent variables

The NH resident demographics and clinical data were also extracted from the regional database collecting assessments performed by the same trained RNs with the Val.Graf tool.[22]

The Val.Graf tool was developed in Italy in the early 1990s as a geriatric, multidimensional assessment instrument for evaluating clinical, psychological and social conditions in different moments: a) at the residents' NH admission, c) every six months, and c) at the NH re-admission for those residents transferred to a hospital. A revised version used in this study was modified in 2001.[22] Validity and reliability measures ranged from adequate to excellent in all dimensions. [22]

For the present study, the last available Val.Graf assessment performed in 2013 for each NH resident included was considered. In addition to age and gender, the following data was taken from the Val.Graf database:[22]

- Activities of Daily Living (ADL) independence, as measured using the Barthel Index (BI)[23] composed of 10 items. The total score ranges from 0 (totally dependent) to 100 (totally independent);
- Cognitive impairment defined as a loss of memory, of spatial orientation, of person recognition and of comprehension using the Cognitive Performance Scale (CPS).[24] The tool classifies six levels of cognitive impairment, from 0 (intact cognitive status) to 6 (very severe

cognitive impairment). A cut-off of >4 was set for identifying those patients with moderate severe/very severe cognitive impairment;[24]

- Depression, as measured by the Depression Rating Scale (DRS).[25] The total score ranges from 0 to 14 and scores ≥3 indicate minor or major depressive disorder;[25]
- Pain, as measured using the Pain Scale,[26] ranging from 0 (no pain) to 3 (severe pain). Those residents reporting a score ≥ 1 were considered to be experiencing pain; in addition, data regarding the administration of anti-pain medication (yes/no) was also collected.
- Pressure sores (yes/no) as defined by the European Pressure Ulcer Advisory Panel;[27]
- Sleep disorders, night restlessness, wandering, physical and/or verbal aggressiveness, social inadequacy (e.g. undressing in public), unsociability (such as a resident who prefers loneliness, avoid companionship and social contact), resisting cooperation in daily care, as measured with the Behavioral Problems Scale included in the Val.Graf tool.[22] Each item was rated from 0 (absent) to 4 (present on a daily basis) and a cut-off of ≥ 3 was set for identifying those residents who had suffered from behavioral disorders in the previous week;[22]
- Relationships with family, health-care workers, and volunteers/spiritual supporters in the last month, as measured with a dichotomous variable (yes/no);[22]
- Clinical instability as measured using the Clinical Instability Score included in the Val.Graf tool,[22] with a scale ranging from 0 (stable) to 4 (requiring close monitoring). A cut-off of ≥ 3 was set for identifying those clinical residents who were unstable.

At the NH level, data was collected for the following variables in a regionally populated database during the same period:

- NH status as non-profit (offered and/or accredited periodically by the Local Heath Trust [LHT]) and profit (not controlled and/or accredited periodically by the LHT),
- size, measured as the number of beds available, and
- the amount of care (hours or minutes/day at the NH level or at the resident level) delivered on a daily basis by different professional profiles such as: a) professional educators, with a

diploma or college-level education, working with the mission of designing and implementing interventions promoting individual, social and meaningful activities among residents; b) physiotherapists, educated at the diploma or college level, working with the mission to tailor and implement interventions to promote functional independence through rehabilitation; c) registered nurses (RNs) as educated at the university or diploma level, offering nursing care, and d) nursing aides (NAs) trained with short courses – one year in length on average – offering basic care under the supervision of RNs. While in the case of professional educators and physiotherapists the amount of care was considered at the facility level, given that they offered both individual and group activities, for RNs and NAs, the amount of care was measured in minutes/resident day.

In addition, in order to account for the unobserved heterogeneity existing across different facilities, a random effect at the NH level was considered.

Ethical Issues

Ethical approval was obtained from the regional Ethics Committee in 2012. Resident and NH data was kept anonymous during the process of data extraction.

Data analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS Inc. 233 South Wacker Drive, Chicago). Averages and 95% Confidence Intervals (CI) for continuing variables, sums and percentages for the categorical variables, were performed. Inactivity – defined as residents not performing any individual-, social- and meaningful activities in the previous week, was the dependent variable. Preliminarily, comparison between inactive and active residents was performed using the χ^2-test, t-test and nonparametric Mann-Whitney test, depending on the nature of the variables. A model was designed considering the evidence available in the field[18,21] and the findings of the bivariate analysis. Given that data in the study was nested (residents within each NH), a

hierarchical generalized linear mixed-effects model (GLMM) that incorporated both fixed-effects parameters and random effects in the linear predictor, was used. In particular, in accordance with Skrondal and Rabe-Hesketh,[28] NHs were considered as a random effect, thus capable of accounting for the heterogeneity of the facilities and allowing evaluation of correlations among patients within the observed facilities. Four different models were designed and performed; the selection of model covariates was based on the evaluation of model appropriateness of fit using Efron's R^2 and McFadden's R^2 indices.[29,30] The findings were calculated with the *R* package[31] and were expressed by Odds Ratios (OR) with a 95% CI. The criterion for statistical significance was set at P< .05.

RESULTS

Residents

A total of 8,875 residents with an average age of 85 years (95% CI 84.8–85.2) were included. The majority were females (6,654; 75%). Some of the 7,491 (84.4%) residents were living in a not-for-profit NH and almost half (4,459; 49.1%) in large NHs with ≥200 beds. Those NHs offering care by professional educators (80.5%) delivered on average 12.5 hours/day (Median 9.4, Standard Deviation [SD] 11.8); those offering rehabilitation services by physiotherapists (92.0%), delivered on average 16.5 hours/day (Median 13.0, SD 1.2). All NHs offered nursing care by NAs and RNs for, on average, 60 and 15 minutes/day/resident, respectively.

Participant residents were dependent in their ADLs, reporting an average Barthel Index score of 30.2 (95% CI 29.5–30.8). The average CPS score was 3.19 (95% CI 3.14–3.23) and 36.9% (3,273) of the residents reported a CPS score >4, thus indicating severe cognitive impairment. The average score of DRS was 2.59 (95% CI 2.53–2.63), and around 40% (3,467) of the residents reported a DRS score ≥3, thus indicating the presence of depressive disorders. With respect to the Pain Scale, the score was on average 0.69 (95% CI 0.67–0.70) and 47.5% (4,213) of residents were on anti-pain medication. The prevalence of pressure sores was 10.4% (925); moreover, around a quarter of the residents were suffering from one or more behavioral problems, such as sleep disorders (2,602;

29.3%), night restlessness (2,334; 26.3%), resisting collaboration in daily care (2,110; 23.8%), and verbal aggressiveness (1,920; 21.6%). Social inadequacy (1,222; 13.8%), physical aggressiveness (961; 10.8%) and wandering (885; 10.0%) were also reported among the residents, but less frequently.

The majority of residents (5,662; 63.8%) were supported by close relationships with family; fewer reported close relationships with healthcare workers (3,284; 37%), volunteers or spiritual supporters (1,257; 14.2%). Some 41.7% (3,704) residents were clinically unstable, thus requiring close monitoring and surveillance.

A total of 4,042 (45.6%) residents were inactive; thus, they did not perform any individual-, -based, or meaningful activities in the week before the evaluation. Some of the residents, 24.9% (2,206) were engaged in at least one activity, 19.9% (1,669) in two activities, and only 9.7% (858) in all activities assessed.

Profile of inactive residents

The profile of residents performing or not each activity considered in our study, is shown in Table 1. A large majority of the residents, in the week before the assessment, were not engaged in any activity; more residents were engaged in individually-based activities (44.6%) than socially-based activities (36.3%), and few were involved in meaningful activities (12.9%). Residents not performing any activity reported an individual profile that was significantly different from those engaged in some form of activity, with the exception of age (P = .317), pain (P = .528) and the occurrence of wandering behavior (P = .135), which were homogeneous across all the groups. Those not engaged in any individually-based and meaningful based activities were also significantly different in their profiles as compared to those who were engaged in all the variables included in the study.

At the overall level, as shown in Table 1, inactive residents as compared to those who were active, were statistically more often male (77% vs. 73.2%), older (85.8, 95% CI 85.5–86.1 vs. 84.3, 95% CI 84.0–84.6), with greater dependence on ADLs (on average 15.6 out of 100, vs. 44.2);

moreover, they were cognitively impaired (63.9% vs. 14.3%), suffering from pain (49.6% vs. 45.0%), receiving anti-pain medication less often (44.2% vs. 50.2%), and reporting a greater prevalence of pressure sores (15.6% vs. 6.1%). In addition, inactive residents more often had sleep disorders (35.6% vs. 24.1%), night restlessness (34.4% vs. 19.5%), wandering (11.0% vs. 9.1%), physical (15.2% vs. 7.1%) and verbal aggressiveness (22.8% vs. 20.6%) as compared to those who were active. Inactive residents also showed more often unsociable behavior (19.2% vs. 9.1%), a desire to be alone (91.0% vs. 59.4%) and, in general, a lower occurrence of close relationships with family members (49.3% vs. 76.0%), with health-care workers (23.2% vs. 48.6%) and with volunteers/spiritual supporters (7.4% vs. 19.9%) as compared to active residents. Finally, resistance to cooperation was more often reported among inactive residents (32.3% vs. 16.7%), as was the need for close monitoring and surveillance due to clinical instability (48.3% vs. 36.3%), as compared to active residents.

The profile of the residents was homogeneous (*P* .43) with respect to depression: according to the findings, 39.7% among the inactive residents and 38.5% among those active reported a DRS score ≥ 3, thus indicating the presence, in both groups, of depressive disorders.

Predictors of resident inactivity

The findings emerged from the GLMM show appropriateness measures: Efron's R^2, McFadden's R^2 and the proportion of cases correctly classified by the model predictions, were .410, .304 and .787, respectively.

At the individual level, those residents reporting a close relationship with family were protected by around 48% from the risk of being inactive (OR .527, 95% CI .446–.605). In addition, being more independent in ADLs (OR .981, 95% CI .979–.984), assuming anti-pain medication (OR .791, 95% CI .664–.941), demonstrating verbal aggressiveness (OR .733, 95% CI .614–.875), having close relationships with health-care workers (OR .650, 95% CI .559–.751) and volunteers/spiritual supporters (OR .628, 95% CI .507–.777), were associated with a reduced likelihood of inactivity.

In contrast, those residents with severe cognitive impairment (OR 4.462, 95% CI 3.880–5.132) and demonstrating unsociable behavior (OR 2.961, 95% CI 2.522–3.473), were more likely to be inactive. Moreover, those residents demonstrating night restlessness (OR 1.605, 95% CI 1.395–1.853), lack of cooperation in daily care (OR 1.408, 95% CI 1.199–1.643), pressure sores (OR 1.314, 95% CI 1.065–1.622), depressive disorders (OR 1.242, 95% CI 1.089–1.416) and clinical instability (OR 1.110, 95% CI 1.037-1.188), reported an increased risk of being inactive.

With regard to NH-level variables, no significant differences emerged across NHs while for each additional hour of care offered by professional educators at the NH level, there was 1% less likelihood of inactivity occurrence (OR .964, 95% .933-.996).

DISCUSSION

Profile of inactive residents

Describing the occurrence of inactivity among residents living in NHs and exploring predictors at the individual and the NH levels, were the main aims of the study. Previous studies measured resident participation in some daily activities, such as watching TV, performing ADLs or instrumental ADLs,[4] and the association between activity and some socio-demographic (e.g. race[18]) or clinical data (e.g. wandering, dementia).[6,10,13,20] Further studies have also explored the effects of some programs aimed at maintaining[32] or enhancing activity engagement;[33,34] moreover, other studies have measured the effects of activity on neuropsychiatric symptoms[35] and on the quality of life.[36,37] However, a few studies to date have compared the whole profile (e.g., functional dependence, cognitive, emotional) of inactive residents with those of active residents, with respect to different types of activities, considering also NH characteristics among the predictors.

According to the findings, in a large sample of NHs regulated by the same laws, 45.5% of residents were inactive in the last week of their lives, a rate generally in line with previous studies (from 28% to 87%),[13] despite the fact that differences in the concept of inactivity[4-5] and in the measurement methods adopted[4] limit comparisons.

In our study residents were more often active in individually-based activities while those that were socially-based, requiring interaction with other residents, and those referred to as meaningful activities, requiring data collection on preferences and on the capability of attributing meaning in doing something, were reported less often or more rarely. In the minimum data set, no data was collected routinely with regard to resident habits and preferences before their NH admission; therefore, no conclusive inferences can be drawn with regard to whether the inactivity was NH-acquired or not.

Inactive residents were generally older, highly dependent on ADLs and cognitively impaired as documented previously.[1,6,13,18,38] Also, the occurrence of behavioral disorders, such as night restlessness, verbal/physical aggressiveness, lack of cooperation in daily care, and clinical problems (e.g., pressure sores, clinical instability), were significantly higher among inactive residents as compared to active residents. Inactive residents also reported a higher severity of pain, and they were less frequently on anti-pain medication as compared to active residents. Thus, frail residents, being functionally, clinically or cognitively compromised, are more likely to be inactive; these are also the residents who are often not capable of expressing their needs (e.g. pain control) and/or wishes (which kind of activities they prefer), and this may reduce their engagement both in social and individual activities.[6] The lack of individual and social stimuli among inactive residents could simultaneously be seen as a cause and an effect of functional and cognitive decline.[39] With regard to the later residents who require greater professional care, due to the personnel shortages often reported at the NH levels, the staff may perceive resident engagement as an additional burden and a time-consuming task.[34]

Finally, inactive residents were also less engaged in close relationships with relatives, health-care workers, and volunteers/spiritual supporters. Therefore, they were more likely to be alone as compared to the active residents;[40] this may affect their motivation to be involved in activities, and increase the need for emotional support.

Predictors of resident inactivity

To our best knowledge, this is the first study using the GLM model incorporating both fixed-effect and random effect parameters. Two previous studies[6,18] have instead performed a regression analysis to determine the association between some demographic and clinical data and resident social engagement. Kang's[6] study explained 22% of the variance in resident social engagement, while Bliss et al.[18] documented low social engagement predictors among NH residents e.g., low social engagement at admission and functional dependence. Comparisons of findings are limited due to the different analyses performed and the different predictors considered.

At the individual level, more independence in ADLs and receiving anti-pain medication, have demonstrated a lower likelihood of being inactive, suggesting that functional independence and pain relief should be considered key factors in preventing inactivity among NH residents. When residents are free from pain, they may also have an increased degree of independence, and they may feel more motivated to be active;[6,18] also, perceiving them as more motivated, NH staff may increase their participation in some activities.[34] In accordance with the findings, verbal aggressiveness was also a protective factor against inactivity, suggesting that NH staff may try to manage this behavioral disorder by diverting residents' attention to safe and acceptable activities.[41]

At the individual level, having close relationships with family, health-care workers and volunteers/spiritual supporters, was associated with a reduced likelihood of inactivity. Residents receiving support from their family and/or capable of interacting with significant others are generally healthier,[42] and thus more active. During activities, residents can talk, get to know each other, and also develop a close relationship with staff members,[42] thus reducing loneliness. On the other hand, residents with limited relationships with families, volunteers, and health-care workers, may experience loneliness; therefore, they may be less motivated to participate in activities offered by the NH.

In contrast, residents suffering from severe cognitive impairment and depressive disorders were more likely to be inactive as documented previously.[6,13,18,19] Also, those residents suffering from night restlessness and not cooperative in their daily care, have reported a higher risk of inactivity. These

behavioral disturbances may be associated with cognitive decline; in the case of the first group, they may spend the day sleeping, thus reducing the possibility of being engaged; in the case of the second group, scarce cooperation may increase staff attempts to engage them. Finally, those residents suffering from clinical instability have reported increased risk of being inactive: symptoms such as fatigue or discomfort may reduce willingness to participate in activities, and increase resident desire for bedrest.

At the NH level, only one factor among those considered in the model was protective against inactivity: increased amount of care offered by professional educators has reduced the likelihood of resident inactivity by around 1%. Differently, the amount of care offered by physiotherapists, RNs and NAs, was not associated with inactivity. The mission of the latter health-care professionals is mainly to enhance physical and psychological well-being of residents.[13,34] Moreover, residents who received a high amount of care by RNs and NAs were potentially more functionally dependent; therefore, nursing staff may have spent more time seeking to compensate for functional impairments instead of encouraging residents to be engaged. Nursing shortages may favour the provision of basic care instead of promoting activity engagement.[43] Therefore a mix of health-care professionals with different competences, where those services specifically aimed at promoting engagement are also provided, is recommended.

Finally, no differences across NHs emerged, between profit and non-profit facilities, as well as between larger and smaller NHs. While the same socio-economical context and rules on NH management at the regional level may have influenced homogeneity, larger environments may offer social and recreational programs while those smaller NHs may increase the opportunity for staff members to assess resident preferences and interests, to tailor services.[21]

Strengths and limitations

The main strength of the study is the high number of NHs and residents involved. Nevertheless, the retrospective study design adopted may have introduced some inaccuracies in the

data collection and recording; however, RNs working in the involved NHs were trained to complete the Val.Graf tool.[22] In addition, given that the regional rules and laws were the same for all NHs, also with regard to those NHs that were run for-profit, and given that data collection was performed in the same time period, we assumed homogeneity in the resident NH admission criteria as well as in the cultural patterns that may influence engagement.[21]

We have considered three types of activities: individual, social, and both individual/social meaningful recreational activities. Among the first activities, we also considered watching television, which has been considered as inactive time recently, given the passive role of the resident (often sleeping in front of the television).[1,5] Moreover, the conceptual definition assumed by the Val.Graf tool[22] for meaningful activities was quite different from other definitions given recently;[44] therefore, findings should be generalized for similar activities.

In addition, data was collected with regard to the week before and may reflect the short period considered, when clinical instability, as well as hospital discharge or other events (e.g., falls) may have affected resident activity. Moreover, no data regarding the prescription of sedative medication, which may also negatively affect activity, was collected.

Finally, Reverse Causation Bias[45] with respect to some of the assessed variables – such as depression, which may be considered a consequence but also an antecedent of inactivity – may have also affected the study findings: the retrospective cross-sectional nature of the study prevented a clear definition of the cause and effect of some of the variables considered. Furthermore, we have always considered inactivity as a therapeutic target, but sometimes residents may be appropriately inactive due to their frailty, or end stage physical illness or end stage dementia. Therefore, longitudinal studies are recommended, aimed at identifying the specific contribution of each predictor.

CONCLUSIONS

Around half of the residents living in Italian NHs are inactive. Inactivity is significantly associated with the presence of severe cognitive impairment, of behavioral disorders, such as

unsociability, night restlessness and lack of cooperation in daily care, pressure sores, depressive symptoms and clinical instability. Moreover, receiving care from professional educators, who have in their training and professional mission the aim of improving individual and social engagement, decreases the likelihood of resident inactivity.

Some of the predictors that have emerged may be considered modifiable factors, while others may not. With regard to the changeable predictors, interventions to reduce behavioral disorders, in particular those aimed at identifying factors precipitating behavioral disturbances (e.g. pain), and assessing depressive disorders, are suggested to prevent inactivity among NH residents. In addition, facilitating family engagement in the planning of care and, for those residents who are alone, facilitating the presence of volunteers/spiritual supporters and having more time to be offered by health care workers, may prevent inactivity.

Given that a greater amount of care in the NHs is offered by RNs and NAs, there is a need to prepare them to engage residents in all the activities they can perform; thus reducing compensatory interventions and stimulating participation in the appropriate strategies. Designing NHs with a permanent service dedicated to promoting individual and social engagement, capable of assessing resident preferences and habits to involve them in meaningful activities, are also recommended.

With regard to the unchangeable risk factors, it is necessary to plan activities tailored to the level of cognitive impairment and ADL dependence of residents in order to maintain their activity engagement. In addition, given the lack of research in the field, more studies aimed at detecting modifiable and unmodifiable factors both at the individual and at the NH levels across different countries, are suggested.

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Table 1
Profile of residents involved or not in social, individual, and meaningful activities (N= 8,875)

Variables	Socially based activities		Individually based activities		Meaningful activities		Residents	
	Yes (%) n=3,216 (36.3)	No (%) n=5,659 (63.7)	Yes (%) n=3,956 (44.6)	No (%) n=4,919 (55.4)	Yes (%) n=1,146 (12.9)	No (%) n=7,729 (87.1)	Active (%) n=4,833 (54.4)	Inactive (%) n= 4,042 (45.6)
Age (years), mean (95% CI)	84.08 (84.5–85.2)	85.0 (84.8–85.3)	84.0 (83.7–84.5)	85.8 (85.5–86.0)**	83.6 (83.1–84.2)	85.2 (85.0–85.4)**	84.3 (84.0–84.6)	85.8 (85.5–86.1)**
Females	2,527 (78.6)	4,127 (72.9)**	2,284 (71.6)	3,829 (77.7)**	910 (79.4)	5,744 (74.3)**	3,540 (73.2)	3,114 (77.0)**
Barthel Index, mean (95% CI)a	42.1 (42.0–43.2)	23.4 (22.7–24.1)**	45.4 (44.4–46.4)	17.9 (17.2-18.6)**	59.7 (57.9–61.5)	25.8 (25.2–26.5)**	42.4 (41.5–43.3)	15.6 (14.9–16.2)**
CPS > 4b	515 (16.0)	2,758 (48.7)**	374 (9.5)	2,899 (58.5)**	76 (6.5)	3,998 (51.7)**	692 (14.3)	2,581 (63.9)**
DRS ≥ 3c	1,181 (36.7)	2,286 (40.4)**	1,488 (37.6)	1,979 (40.2)*	401 (35.0)	3,066 (39.7)**	1,861 (38.5)	1,606 (39.7)
Pain Scale ≥ 1	1,523 (48.0)	2,637 (47.3)	2,016 (51.6)	2,144 (44.3)**	572 (50.9)	3,788 (47.0)*	1,795 (45.0)	2,365 (49.6)**
Under medications for pain	1,576 (49.0)	2,637 (46.6)*	2,062 (52.1)	2,151 (43.7)**	610 (53.2)	3,603 (46.6)**	2,426 (50.2)	1,787 (44.2)**
Pressure sores	158 (4.9)	777 (13.6)**	234 (5.9)	691 (14.0)**	36 (31.6)	889 (11.5)**	296 (6.1)	629 (15.6)**
Sleep disorders	780 (24.3)	1,823 (32.2)**	866 (21.9)	1,737 (35.3)**	251 (21.9)	2,352 (30.4)**	1,166 (24.1)	1,437 (35.6)**
Night restlessness	634 (19.7)	1,700 (30.0)**	657 (16.6)	1,777 (34.1)**	187 (16.3)	2,147 (27.8)**	943 (19.5)	1,391 (34.4)**
Wandering	341 (10.6)	544 (9.6)	269 (6.8)	616 (12.5)**	81 (7.1)	804 (10.4)**	439 (9.1)	446 (11.0)**
Physical aggressiveness	220 (6.8)	941 (16.1)**	233 (5.9)	728 (14.8)**	54 (4.7)	907 (11.7)**	345 (7.1)	616 (15.2)**
Verbal aggressiveness	597 (18.6)	1,323 (23.4)**	782 (19.8)	1,138 (23.1)**	219 (19.1)	1,701 (22.0)**	997 (20.6)	923 (22.8)**
Social inadequacy	243 (9.1)	229 (16.4)**	279 (7.1)	943 (19.2)**	85 (7.4)	1,137 (14.7)**	440 (9.1)	782 (19.3)**
Unsociability	1,698 (52.8)	4,853 (85.8)**	2,204 (55.7)	4,347 (88.4)**	475 (41.4)	6,076 (78.6)**	2,869 (59.4)	3682 (91.1)**
Lack of cooperation in daily care	457 (14.2)	1,653 (29.2)**	600 (15.2)	1,510 (30.7)**	131 (11.4)	1,979 (25.6)**	806 (16.7)	1,304 (32.3)**
Relationship with families	2,471 (76.9)	3,191 (56.4)**	3,124 (79.0)	2,238 (51.7)**	913 (79.7)	4,749 (71.5)**	3,673 (76.0)	1,989 (49.3)**
Relationship with healthcare workers	1,578 (49.1)	1,706 (30.2)**	2,027 (51.2)	1,257 (25.6)**	623 (54.4)	2,261 (44.5)**	2,347 (48.6)	937 (23.2)**
Relationship with volunteers	714 (22.2)	543 (9.6)**	838 (21.6)	419 (8.5)**	366 (31.9)	891 (11.5)**	960 (19.9)	297 (7.4)**
Clinical instability	1,112 (34.6)	2,252 (45.8)**	1,394 (35.2)	2,310 (47.0)**	355 (31.0)	3,349 (43.3)**	1,752 (36.3)	1,952 (48.3)**

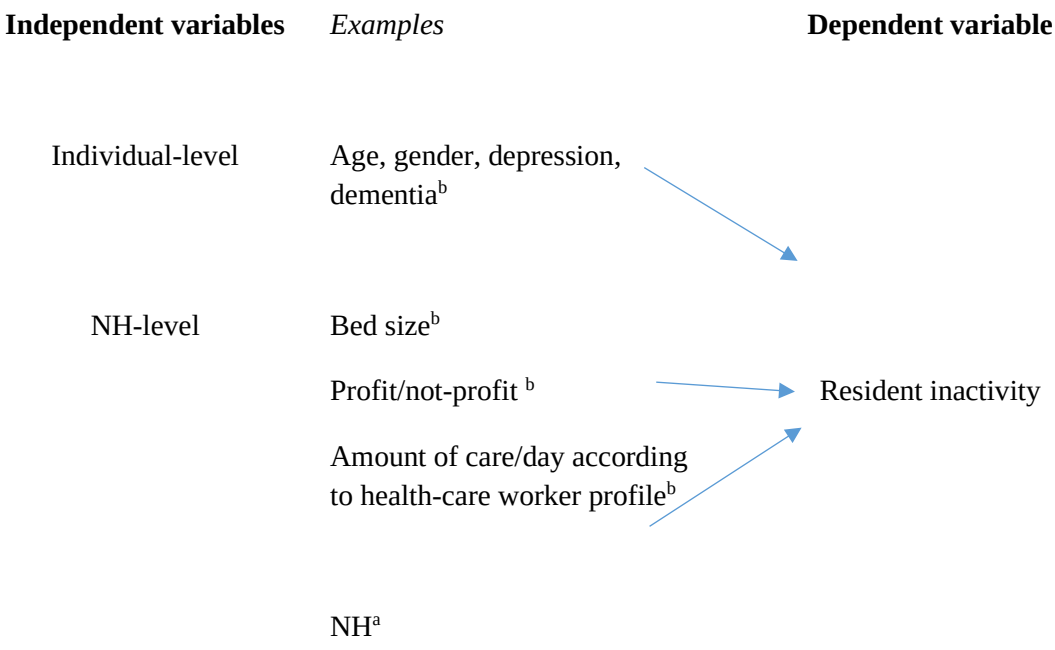
CI, Confidence Interval
[a] BI = Barthel Index = from 0, dependent on activities of daily living, to 100, independent
[b] CPS = Cognitive Performance Scale = from 0, intact cognitive status, to 6, very severe cognitive impairment. Scores >4 indicate severe/very severe cognitive impairment
[c] DRS = Depression Rating Scale = from 0, normal, to 14, very severe depression. Scores ≥3 indicate minor o major depressive disorders
[d] Pain Scale ≥ 1 = patient suffering from a certain degree (slight, moderate or severe) of pain
P-Values are referred to comparison within each category; **P*-Value < .05; ***P*-Value < .001

Table 2
Predictors of resident inactivity (n= 4,042): findings from a hierarchical generalized linear mixed-effects model

Variables	OR	95% CI	P-value
Intercept	.128	.046-.355	.000
Age (years)	1.00	.9986-1.011	.125
Female	1.014	.878-1.169	.849
BI score (0-100)a	.981	.979-.984	.000
CPS score > 4b	4.462	3.88–5.132	.000
DRS score ≥3c	1.242	1.089–1.416	.001
Pain Scale (0-3)d	1.077	.970–1.196	.163
Receiving medication(s) for pain	.791	.664–.941	.008
Pressure sores	1.314	1.065–1.622	.010
Night restlessness	1.608	1.395–1.853	.000
Wandering	.938	.771–1.142	.526
Physical aggressiveness	1.065	.850–1.334	.580
Verbal aggressiveness	.733	.614–.875	.000
Social inadequacy	1.209	.995–1.468	.055
Unsociability	2.961	2.522–3.475	.000
Lack of cooperation in daily care	1.408	1.99–1.653	.000
Relationship with families	.527	.459–.605	.000
Relationship with health-care workers	.650	.559–.757	.000
Relationship with volunteers/spiritual supporters	.628	.507–.777	.000
Clinical instability	1.110	1.037–1.188	.002
Non profit	1.803	.835-3.894	.133
Bed size (number)	1.005	0.999–1.012	.054
Professional Educators (hours/day/NH)	.964	.933-.996	.030
Physiotherapist (hours/day/NH)	.991	.956-1.028	.656
NAs care (minutes/day/resident)	.998	.995-1.001	.302
RNs care (minutes/day/residents)	1.004	.996-1.013	.280

OR, Odds Ratio; CI, Confidence Interval; NAs, Nurse Aides; RNs, Registered Nurses
[a] BI =Barthel Index, from 0, dependent on activities of daily living, to 100, independent
[b] CPS= Cognitive Performance Scale >4 indicate severe/very severe cognitive impairment
[c] DRS= Depression Rating Scale= scores ≥3 indicate minor o major depressive disorders
[d] Pain Scale= from 0, no pain, to 3, severe pain

Figure 1. Framework of the study



Legend: [a]as a random effect; [b]as a causal effect; NH Nursing Home