Author's response to reviews

Title: Unmet need and psychological distress predict emergency department visits in community-dwelling elderly women: a prospective cohort study

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Author's response to reviews: see over
Dear Editorial Team,

Please find attached the revised version of our paper for BMC Geriatrics entitled “Unmet need and psychological distress predict emergency department visits in community-dwelling elderly women: a prospective cohort study.” Based on the reviewer’s comments and suggestions, we have made substantial revisions to the paper. Several sections have been rewritten, and several other sections revised; we believe that the changes strengthen the paper a great deal. The specifics of how we addressed each of the reviewer’s suggestions are listed on the following pages. If you require any further information, please don’t hesitate to contact me.

Sincerely,

Jacqueline Quail
Summary of changes to
“Unmet need and psychological distress predict emergency department visits in community-dwelling elderly women: a prospective cohort study”

Suggestions and comments from Reviewer 1 (Namkee G Choi):

1. (Major compulsory) The authors employed a logistic regression analysis with two primary independent and many control variables; however, there is no theoretical framework and hypotheses. A theory-based approach to conceptualizing their research questions and clearly specified hypotheses is desirable.

We added support for our conceptual model in the Background section, paragraph 7 “Previous research indicates that disability can lead to the development of one component of psychological distress, depression. There is also evidence that depression can contribute to the development of disability through impaired ability and/or willingness to maintain one’s health through proper nutrition, physical activity, and socialization. This lack of self-care may extend to the development of unmet need. It is possible that the association between unmet need and psychological distress is bidirectional, in that disabled elderly persons with unmet need may become distressed as a result of the daily and difficult struggle to perform ADL, while psychological distress may prevent disabled elderly persons from actively seeking help and/or being able to accept help when it is offered. Over time, the reciprocal effect of one upon the other could lead to a mutually reinforcing cycle.”

We now explicitly state our conceptual model in paragraph 10 of the Background section. “Based on our literature review, we created the following conceptual framework to guide our research. First, we believe that both unmet need and psychological distress are independent predictors of ED visits. We also believe that there is a bidirectional, mutually reinforcing relationship between unmet need and psychological distress. We hypothesize that unmet need, but not met need, is associated with an increased risk of visiting the ED. We further hypothesize that the association will be stronger for PADL unmet need than for IADL unmet need because disability in PADL is more severe. Finally, we hypothesize that psychological distress interacts with unmet need to increase the likelihood of visiting the ED, such that distressed women with unmet need are more likely to visit the ED than women with unmet need who are coping well.”

2. (Major compulsory) Age inclusion criterion was specified as 75 years and older in the abstract and in the third line in the Source of Data section. However, the subsequent descriptions of survey/interview data collection are all about 65 years and older. Please clarify these discrepancies.

Leger Marketing maintains lists of Quebec residents in categories, specifically age 18-24, 25-34, 35-44, 45-54, 55-64, and age 65 and older. Leger Marketing randomly contacted households that had a member in the ‘age 65 and older’ category looking for a person who was 75 or older.

We added the following clarification to paragraph 1 of the Methods: Source of Data section. “From this survey list, Léger Marketing recruiters phoned 4,775 households known to contain a person 65 or older, were able to contact 4,420, and within these households identified 1300 seniors aged 75 and older who met the eligibility criteria.”
3. (Major compulsory) In the measurement section, it was unclear how the “no need” was scored. (See: “Once each participant’s level of need (no need, met need, or unmet need) was determined for each PADL and IADL, we aggregated the results into counts of met and unmet PADL and IADL need. We categorized IADL unmet need and the IADL net need as 0, 1, and 2 or more.”) I do not see any description of the scoring for “no need.” This is troublesome also because it is not at all clear how the “no need” was included in the logistic regression analysis. The analysis section needs to be clearer in its description of the variable attributes. Moreover, the last paragraph on adjusting for disability is very confusing to read. For example, in the second to the last sentence, “0 PADL met need” was entered in the equation as 0, while 1 IADL met need was entered as 1, so if a subject’s PADL need was not met, her disability score is low? Why can you just state that the disability score is the number of ADL/IADL impairments? I do not understand why this sentence is needed at all, as I do not see the disability score used anywhere in the analysis. The disability-related variables entered in the logistic regression model are the numbers of met and unmet needs.

Given that disability is independently associated with unmet need, psychological distress, and the use of health services, we knew it was essential to adjust for disability to prevent confounding. A common way to model disability is as a count of the total number of ADL in which study participants are disabled. We first considered modeling overall disability and unmet need in the same model, but quickly realized we would introduce the problem of multicollinearity because unmet need comprises part of disability, and thus, the two are strongly correlated. Our solution was to break disability down into its most basic components (i.e., IADL met need, IADL unmet need, PADL met need, PADL unmet need).

To say it in another way:
- Total disability = IADL disability + PADL disability.
- If a person is disabled, their need will be either met or unmet.
  - IADL disability = IADL unmet need + IADL met need.
  - PADL disability = PADL unmet need + PADL met need.

Therefore:
- Total disability = IADL unmet need + IADL met need + PADL unmet need + PADL met need.

In the table below, Column A shows the breakdown of IADL and PADL disability in a hypothetical subject. Columns B, C, and D show further breakdown into IADL and PADL met and unmet need and some of their possible combinations. Column E shows how a non-disabled person would be modelled. Using this approach, it is possible to adjust for the severity of disability while simultaneously estimating the individual effects of IADL and PADL unmet need and met need. For example, in the multivariable model the odds ratio for IADL unmet need is 1.57. We would interpret the results of the model in the following way. If two people are identical in terms of disability and unmet need, with the exception that one has 1 IADL unmet need and the other does not, the person with 1 IADL unmet need is 57% more likely to visit the ED.
Relationship between disability and IADL and PADL met and unmet need

<table>
<thead>
<tr>
<th></th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>Column D</th>
<th>Column E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IADL disability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IADL unmet need</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IADL met need</td>
<td></td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>PADL disability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PADL unmet need</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PADL met need</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total disability</strong></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

We clarified our description in the last paragraph of the Methods: Disability and Unmet Need section.

“A common way to model disability in statistical analyses is as a count of ADL in which study participants are disabled. We used this approach, but took it one step further by subdividing disability into its four constituent components; that is, counts of IADL unmet need, IADL met need, PADL unmet need, and PADL met need. Taken together, these four categories represent the total number of ADL in which a person requires physical assistance (i.e., total disability).”

4. (Minor essential) Place of residence: The authors may need to say a bit more about the control variables. For example, what does senior housing refer to? Do they differ from what we call assisted living facilities in the US? Or are they like low-income, public housing for older adults?

We now describe seniors’ housing in the first paragraph of the Methods: Covariates section.

“A seniors’ residence refers to a multi-unit housing development that offers either independent living or assisted living. Residents should theoretically be either independent or have met needs, but it is possible that some residents may have developed unmet need in the years since they moved to the residence.”

5. (Discretionary) Self-rated health: What was the original scale before it was dichotomized as good or poor?

We now clarify the variables in paragraph 3 of the Methods: Covariates section.

“Self-rated health was dichotomized such that “excellent,” “very good,” and “good” responses were categorized as “good,” and “fair,” “poor,” and “very poor” responses were categorized as “poor.”

We dichotomized the results because very few participants rated their health at the extreme ends of the scale, especially among those who visited the ED. Dichotomizing self-rated health also increased the parsimony of the model.
6. (Minor essential) ED visits: it would help if you can provide count data on the number of ED visits, even if you collapsed the variable into a dichotomous one. If there is a substantial range, it may help to conduct a zero-inflated negative binomial analysis (it is a count outcome) to see if the number of ED visits may be a significant factor.

We did not present count data on ED visits for two reasons. First, only 21 (4%) of participants visited the ED multiple times. Second, the very act of visiting the ED may change a person’s need status. Specifically, health events can precipitate new unmet needs while contact with the health care system can lead to unmet needs becoming met. Since we could not be certain of a person’s need status at subsequent ED visits, we restricted our analyses to only the first ED visit.

We included the following in the first paragraph of the Results section.

“Descriptive analyses found that multiple ED visits were rare. Only 21 women visited the ED more than once (data not shown).”

7. (Discretionary) Discussion and interpretation: The authors speculated that the significance of met PADL as a predictor of ED visit may be because family member and homecare workers are more likely to provide transportation for the older adults to ED. This may be so, but I wonder if further data on how these older adults were transported to ED (e.g., private car or ambulance) may be needed before speculating on this.

No information is available on how people were transported to the ED, nor on the appropriateness of the ED visit. Certainly, further research is needed to investigate whether our speculations are true.
Suggestions and comments from Reviewer 2 (Laura Sands):

1. This study offers a novel perspective in understanding the association between unmet need and health behaviors. Specifically, the authors suggest that psychological distress may affect the association between unmet needs and subsequent health care utilization. The authors provide some background for this hypothesis, but they do not describe the conceptual framework underlying the hypothesis tested in this study. Without such a framework it is difficult to know whether the authors hypothesize that psychological distress mediates or moderates the association between unmet need and subsequent health care utilization. Also, in the absence of such a framework, it is unclear why the authors designated some of the covariates (e.g. nutritional status) as predictor variables rather than as outcomes.

The conceptual model is addressed in response to the other referee (comment 1). The conceptual model is discussed in paragraphs 7 and 10 of the Background section.

Re: predictor variables versus outcomes.
All data were gathered during the baseline interview with the exception of data on health services utilization, which were abstracted from an administrative database. As a result, health services are the only variables for which we can establish temporality and evaluate a predictive association.
2. An important issue that is missing from their review of the literature is how the timing of assessments of unmet need and health care utilization affect interpretation of results. For example, they cite results from the Allen and Mor study as evidence of the health consequences of unmet need. However, the cross-sectional design of that study prevents determination of whether unmet need preceded or followed the health events. This is important because health events (e.g. illness that requires hospitalization) can precipitate new unmet needs. I suggest that the authors consider an important study by Kuzuya et al. (JAGS, 2008) that examines the association between unmet needs for medication support and subsequent hospitalization. Similarly, relevant results from the Sands’ study are those that refer to the pattern of acute care admissions subsequent to assessments of unmet need, not those that refer to hospitalizations prior to assessments of unmet need. The authors should consider the issue of timing when describing their conceptual framework. Distinguishing whether unmet needs precedes or follows psychological distress is important for informing the design of future interventions to reduce consequences of unmet need.

We agree that health events can precipitate new unmet needs, or alternatively, contact with the health care system can lead to unmet needs becoming met. In fact, it was for this reason that we chose our outcome to be ‘at least one ED visit’. If we used the total number of ED visits, our results could be confounded by an undocumented change in unmet need status after the first visit to the ED. We could have done a better job of discussing temporality in our literature review and added the following into the Introduction to be more specific on the issue of timing:

Introduction section, paragraph 4

“However, the cross-sectional study design makes it impossible to know if unmet need preceded these events or vice versa.”

Introduction section, paragraph 5

We expand upon Sands et al’s work to include the longitudinal component. We now include Kuzuya et al’s research in our literature review. Thank you for the recommendation.

We discussed timing in regards to the potential bidirectional association between unmet need and psychological distress when discussing our conceptual model in an earlier response.
3. It is unclear what traits the psychological distress scale measures. The content of the scale should be described.

We added the IDPESQ-14 in Figure 1. Additionally, we now describe psychological distress in more detail on paragraph 6 of the Background section.

“Psychological distress is conceptualized as having four components (Ridner, 2004). In addition to anxiety and depression, psychological distress can manifest as irritability as well as cognitive problems that impede a person’s judgement and ability to think clearly, such that a person has difficulty following simple instructions, misinterprets obvious information clues, or has difficulty remembering information and facts that are actually known well.”

4. What type of care is available in a ‘Senior’s residence’? Did subjects in this living environment have continuous access to care for their disabilities? If so, then theoretically these subjects should have had their needs met.

Senior’s residence refers to a facility that may be an independent living facility, an assisted living facility, or a combination of both. An independent living facility provides supportive services for IADL but not PADL. An assisted living facility provides supportive services for both IADL and PADL. In theory, any person living in a senior’s residence should have either no need or met need, but this is not the case (see Table 1). This could be explained by the fact that as a person ages within these facilities, they may experience functional decline and eventually develop disability and unmet need.

Self-reported need by ADL among elderly women living in a senior’s residence (n=81)

<table>
<thead>
<tr>
<th>ADL</th>
<th>No need</th>
<th>Met need</th>
<th>Unmet need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meals</td>
<td>56 (69.1%)</td>
<td>14 (17.3%)</td>
<td>11 (13.6%)</td>
</tr>
<tr>
<td>Transportation</td>
<td>30 (37.0%)</td>
<td>32 (39.5%)</td>
<td>19 (23.5%)</td>
</tr>
<tr>
<td>Housekeeping</td>
<td>20 (24.7%)</td>
<td>46 (56.8%)</td>
<td>15 (18.5%)</td>
</tr>
<tr>
<td>Dressing</td>
<td>65 (80.3%)</td>
<td>1 (1.2%)</td>
<td>15 (18.5%)</td>
</tr>
<tr>
<td>Bathing</td>
<td>63 (77.8%)</td>
<td>7 (8.6%)</td>
<td>11 (13.6%)</td>
</tr>
<tr>
<td>Eating</td>
<td>77 (95.1%)</td>
<td>0</td>
<td>4 (4.9%)</td>
</tr>
<tr>
<td>Toileting</td>
<td>72 (88.9%)</td>
<td>0</td>
<td>9 (11.1%)</td>
</tr>
<tr>
<td>Transfers</td>
<td>64 (79.0%)</td>
<td>0</td>
<td>17 (21.0%)</td>
</tr>
<tr>
<td>Moving</td>
<td>70 (86.4%)</td>
<td>0</td>
<td>11 (13.6%)</td>
</tr>
</tbody>
</table>

We clarify this in our description of covariates on first paragraph of the Methods: Covariates section.

“A seniors’ residence refers to a multi-unit housing development that offers either independent living or assisted living. Residents should theoretically be either independent or have met needs, but it is possible that some residents may have developed unmet need in the years since they moved to the residence.”
5. What does the satisfaction with social support scale measure? Do items within this scale overlap with assessment of unmet needs?

Satisfaction with social support was assessed by first giving interviewees examples of positive social support. Specifically they were asked the frequency of having someone:
- comfort them by showing physical affection
- express interest and concern for their well-being
- be right there with them (physically) in a stressful situation
- listen to them talk about their private feelings

Interviewees were then simply asked if they felt they had received enough of this type of social support in the past six months. If they responded in the affirmative, they were identified as being satisfied with their social support.

We provide more information on how we assessed satisfaction with social support in paragraph 2 of the Methods: Covariates section.

“Satisfaction with social support was assessed by first giving interviewees examples of positive emotional support and then asking them if they were satisfied with the amount of support they received.”

6. Explain the system for ER admissions in Canada. Do patients self-refer themselves to the ER? Are there social risks for ER use in Canada? If so, do they overlap with unmet needs? What were the subjects’ diagnoses at ER admission? Do those diagnoses provide further validation for the conceptual framework underlying this study?

We explain the system for ED visits in Canada in the Methods: Emergency Department Visits section.

“All residents of Canada enjoy a universal health care system. Individuals can seek medical help at an ED for any reason at any time and the costs are fully covered by the government.”

Although insurance is not an issue in accessing health services, income certainly is. Income is associated with both unmet need and ED visits, and is not in the causal pathway between unmet need and ED visits, and so meets the definition of a confounder and this is we included it in the multivariable model.

Unfortunately, we do not have access to the subjects’ diagnoses when they presented to the ER.
7. The justification for excluding men is unconvincing. Were results similar when men were included?

The research reported in this manuscript is part of a much larger project in which we examined both men and women. We made the decision to stratify our analyses by sex because of the vast differences between men and women in the final years of their lives. The traditional role of men of an earlier generation was that of breadwinner and handyman; women’s role included being housekeepers and homemakers. Consequently (and despite possessing the physical ability), many elderly men are either unwilling or lack the skills to perform housekeeping and meal preparation. For such men, these IADL tasks are usually performed by their wives. Moreover, men are more likely to have a chronic disease associated with high mortality than are women. As their health and functional ability worsen, their needs are usually met by the care their wives provide. Women, on the other hand, are more likely to survive their husbands and typically end up living alone with limited financial resources. Nearly half (48%) of single and widowed Canadian women age 65 and older have an income below the poverty line. Thus, older women are more ‘exposed’ to the possibility of unmet need.

After we stratified our analyses by sex, we found that only a small number of men reported unmet need. Although we did not have sufficient power, we still conducted an exploratory analysis. As expected, no variables were statistically significant in the multivariable analysis and confidence intervals were quite wide. When comparing point estimates between men and women though, we found some interesting differences. The point estimates for IADL unmet and met needs were similar to those for women, but unlike women, the point estimate for PADL met need was protective against ED visits for men. Furthermore, in women, increased psychological distress was associated with an increased likelihood of visiting the ED while increased psychological distress was associated with a reduced likelihood of visiting the ED in men. These results are interesting but lack the statistical rigor necessary to publish. Certainly, this is an interesting area of future research.

We explain our decision to not report on men in paragraph 8 of the Background section. “We initially set out to explore this association in both men and women. Because of the differences between men and women in the final years of their lives, we stratified our analyses by sex. However, in the stratified analysis there were too few men with unmet need to be able to conduct an informative analysis and so we report here our findings for women only.”

8. Was there sufficient power for assessing the association between PADL unmet needs and subsequent ER use?

Power depends upon both the number of observations and the magnitude of the association being investigated. The magnitude of the association of PADL unmet need with an ED visit could be deemed clinically significant (OR = 0.66; 95% CI: 0.35, 1.24), but since we had very few participants who reported PADL unmet need, the OR failed to reach statistical significance. Despite not being statistically significant, the point estimate still conveys useful information, that is, that PADL unmet need may be associated with a reduced likelihood of visiting the ED, although we lacked the power to detect it.
We commented on the lack power to the discussion in paragraph 3 of the Discussion. “Unlike unmet IADL need, we found no evidence that unmet PADL need predicted ED visits in women. Although the point estimate was not statistically significant, the fact that it was protective was unexpected (OR = 0.66; 95% CI: 0.35, 1.24). A likely explanation is that the point estimate is unstable because so few study participants had PADL unmet need. It is possible that the addition of a few more people with PADL unmet need could markedly alter the point estimate, or even reverse the direction of the association. Future research with greater power may be able to discern if there is truly an association.”

9. It is unclear why those who have no disability are included in the analyses. I would argue that they should not be included because this is a study of unmet needs and only those with at least one disability can have unmet needs. The coding of the unmet need variables should be explained. For example, why does the coding of the unmet needs variables differ for the bivariate and multivariable analyses? Also, it is conceptually unclear why there should be monotonically increasing risk across the categories of 0 unmet needs, 1 unmet needs and 2+ unmet needs as suggested by their statement, “…presence of each additional IADL unmet need increased the likelihood….. by 57%.”

We felt it was essential to include women with no disability in the analyses for the following reasons. First, if we exclude disabled women, the comparison group becomes those women with met need versus unmet need. This works well if each individual has all of their needs either met or unmet, but most women had a combination of both met and unmet need. Second, we completed other analyses (unpublished but currently under review after resubmission in another journal), that found, compared to women who were not disabled, women with unmet need were psychologically distressed, but so were women with met need (just not as severely). For this reason, we wanted to simultaneously explore both met and unmet need in relation to health services use, and this requires a non-disabled reference group.

We could have dichotomized women as having at least one met need versus having all needs unmet, but this is not the question we were interested in. Rather than investigate the effect of the total absence of a caregiver upon health services utilization, we were interested to investigate how the use of health services varies with the number and type of unmet need. If we did dichotomize women as having any met need versus having all needs unmet, the following individuals with different compositions of met and unmet need would all be placed in the met need group when they are quite different.

- Woman 1: 1 met need
- Woman 2: 1 unmet need, 7 met needs
- Woman 3: 7 unmet needs, 1 met need

Even after adjustment for the total number of ADL in which a person is disabled, women 2 and 3 would appear to be the same (i.e., disabled in 8 ADL with at least one unmet need). Furthermore, it is not possible to differentiate between met and unmet need in IADL and PADL using this approach.
We added the following to paragraph 9 in the Background section.

“Research on unmet need has so far focused exclusively on disabled individuals since it is not possible to have unmet need with disability. This only allows an understanding of unmet need in reference to met need. We do not yet understand how individuals with unmet or met need differ from non-disabled individuals with regards to health outcomes. For this reason, we included non-disabled women in our research so that we could simultaneously examine the association of both met and unmet need in conjunction with psychological distress upon ED visits.”

“The coding of the unmet need variables should be explained.”

We displayed the categorizations for unmet and met need differently in the bivariate analyses (compared to the multivariable analysis) simply to give the reader additional information. Since this confused the reviewer, and thus is likely to confuse other people, we changed the bivariate category coding to match those of the multivariable analysis.

“Also, it is conceptually unclear why there should be monotonically increasing risk across the categories of 0 unmet needs, 1 unmet needs and 2+ unmet needs as suggested by their statement, “…presence of each additional IADL unmet need increased the likelihood by 57%.”

We could have modelled IADL unmet need using dummy variables to allow the point estimates to vary between levels of IADL unmet need. We chose not to because the variable IADL unmet need is linear in the logit, indicating that the linear assumption is met and the risk of visiting the ED increases with additional unmet needs. We agree that the increase is unlikely to be monotonic, but felt that any variation we missed by modelling IADL unmet need (and met need as well) as ordinal variables was inconsequential and worth the trade-off of having a more parsimonious model.

10. Two paragraphs in the discussion contrast results from this study with those of other studies. The comparisons are unhelpful because the studies are not comparable. The Allen and Mor study did not assess subsequent health care utilization and the Sands et al. study described unmet need as the complete absence of a caregiver. Conceptually, complete absence of a caregiver is very different than self-reports of unmet need. The authors should use the discussion to describe whether the results of this study confirm their underlying the entire conceptual framework (both the independent variables and covariates).

We have changed the discussion substantially to include a detailed discussion of how the results fit our hypotheses for both the independent variables and select covariates.