PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Management of type 2 diabetes mellitus in people with severe mental illness: an online cross-sectional survey of healthcare professionals
AUTHORS	McBain, H; Lamontagne-Godwin, Frederique; Haddad, Mark; Simpson, Alan; Jones, Julia; Flood, Chris; Mulligan, Kathleen

VERSION 1 – REVIEW

REVIEWER	Douglas Gunzler Case Western Reserve University, USA
REVIEW RETURNED	12-Oct-2017

GENERAL COMMENTS	This is an interesting study of 273 health care professionals' views about clinical roles, and the barriers and enablers to delivery of diabetes care for people with severe mental illness (SMI). However, as it reads, I have comments/suggestions. 1) The sample size estimation does not provide any details about what estimates were used to calculate the required sample size of 200. What type of calculation was used exactly? 2) In the order of the manuscript, should discuss percent missing data first before discussing details of the type of missing data analyses. What was the null hypothesis of Little's MCAR test? Multiple imputation methods make the MAR assumption. If data was truly MCAR, then listwise deletion, nonresponse weighting or ML all are performed under the MCAR assumption. In general, MCAR or MAR is an assumption and the test is just evidence for MCAR. However, in clinical theory it does seem if participants have SMI and diabetes, MAR might be a more reasonable assumption. 3) It is a limitation that all regression analysis was univariate, instead of controlling for other predictors through multiple regression analysis. This is due to the sample size (although some multivariate analyses could be done at this sample size) and could be mentioned as a future direction. 4) Interpreting predictors in terms of clinical significance is more important than just statistical significance. 5) Using nine outcomes with the same predictors, there should be some error rate correction so that results aren't by chance alone. 6) It is mentioned on pg. 25 that multivariate analysis was performed, but this looks like univariate analysis was done and combined into one table.

REVIEWER	Emma McGinty Johns Hopkins Bloomberg School of Public Health, United States

REVIEW RETURNED	24-Oct-2017

GENERAL COMMENTS	Thank you for the opportunity to review this interesting study on a very important topic. This study makes an important contribution to the literature by examining barriers and enablers of diabetes care among people with SMI. My major concerns with the study have to do with the sampling strategy, response rate, and missing data issues; these issues and other minor suggestions are detailed below. 1. The meaning of “threat of discipline” and “fear or mental health” in the abstract and elsewhere in the paper are unclear. 2. In the abstract, the authors state that “despite current guidelines, diabetes care in mental health settings remains peripheral.” Do the guidelines the authors refer to specifically state that diabetes care should be provided by mental health providers? It seems likely that in the absence of a provider group having clear responsibility for executing a given set of guidelines, guidelines alone are unlikely to improve clinical practice. 3. Page 6, the statement “our previous research indicates a clear demarcation between the perceived responsibilities of mental health versus primary care and specialist diabetes services” would benefit from an indication of directionality. Based on the authors’ prior research, which of these provider groups views themselves as responsible for (which elements of) diabetes care among people with SMI? 4. Given that the goal of the study is to understand barriers to delivery of diabetes care for people with SMI, why did the study sample include healthcare providers involved in the care of T2DM and/or SMI, rather than TD2M and SMI? What is the value of including providers in the sample who care for people with T2DM but do not care for people with SMI? 5. What is the response rate of the survey? 386/100,000 (per the text on page 7 regarding the size of the target population) = <1%? This is extremely low and calls into question whether and how the results can be generalized. 6. The authors have major missing data problems, with complete data for only about 40% of participants. Why was missing data such a problem in this survey? The authors exclude people with more than 50% missing data, but report that all variables measured had some missing data. Given this issue, it is not clear to me that valid conclusions can be drawn from this data. 7. Why were general practitioners so underrepresented in the sample? This question relates to my prior questions around sample frame and sample size. It seems that a more targeted, purposive sampling frame designed to yield completed surveys from a pre-set number of physical and mental health providers would have strengthened the authors’ ability to answer their research questions. What was the rationale for the sampling strategy used? 8. The authors state on page 25 that “Taken together, our findings suggest that a number of strategies could be implemented to

	improve the care offered to people with diabetes and SMI, and as a consequence address the inequalities experienced by this population. Identification of these barriers and enablers allows us to identify, using established methods, the behavior change techniques that should be employed within an intervention to improve diabetes care in people with SMI." Which behavior change techniques do the results suggest should be used? What types of interventions do the results suggest might be effective?

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

1) The sample size estimation does not provide any details about what estimates were used to calculate the required sample size of 200. What type of calculation was used exactly?

- The sample size calculation has now been specified in greater detail (page 8).

2) In the order of the manuscript, should discuss percent missing data first before discussing details of the type of missing data analyses. What was the null hypothesis of Little's MCAR test? Multiple imputation methods make the MAR assumption. If data was truly MCAR, then listwise deletion, nonresponse weighting or ML all are performed under the MCAR assumption. In general, MCAR or MAR is an assumption and the test is just evidence for MCAR. However, in clinical theory it does seem if participants have SMI and diabetes, MAR might be a more reasonable assumption.

- The results of the MCAR test have now been moved to the beginning of the results section (page 9). The null hypothesis of Little's MCAR test is that the data are missing completely at random. Data are MCAR when the pattern of missing values does not depend on the data values. Multiple imputation can handle MCAR as well as MAR (Pederson et al 2017). Listwise deletion would have reduced the sample size to a level where regression modelling would not have been possible. Both MI and ML hold similar assumptions, and have similar statistical properties. The authors only had access to SPSS and the implementation of ML within this software can give values outside the possible range of the scale. MI results in unbiased estimates, providing greater validity, was specifically developed for use in surveys (Rubin, 2004) and was hence chosen as the most appropriate method for this study.

3) It is a limitation that all regression analysis was univariate, instead of controlling for other predictors through multiple regression analysis. This is due to the sample size (although some multivariate analyses could be done at this sample size) and could be mentioned as a future direction.

- This we believe is a misinterpretation of the analysis we have conducted. We undertook univariate analysis (correlations) to identify the significant variable to enter in to a multiple Poisson or negative binomial regression. See page 9 for a full description of the analysis plan.

4) Interpreting predictors in terms of clinical significance is more important than just statistical significance.

- The predictors were not clinical measures, however, the authors have added more interpretation of the Exp(β) in order to provide a clearer understanding of the findings of the regression analyses (pages 22-24).

5) Using nine outcomes with the same predictors, there should be some error rate correction so that results aren't by chance alone.

- We thank the reviewers for this important point. We have discussed this issue extensively and feel that as this study is exploratory in nature, seeking to model the processes of T2DM care for people with SMI, as defined by the MRC Framework for Developing Complex Interventions (2008), we are reluctant to adjust the p-value. There has been extensive debate about the need to adjust p-values in studies with multiple outcomes (Feise, 2002). The number of outcome measures considered as a family-wise hypothesis has not been defined and although by not adjusting this may increase the likelihood of a type I error, adjusting it would increase the chance of type II errors, which are no less important. Additionally, by lowering the alpha level and maintaining the beta level we would have needed to increase the sample size, which is not possible post-hoc. We have therefore acknowledged the role of type I and II errors in the discussion (page 30), as recommended by Fiese (2002).

6) It is mentioned on pg. 25 that multivariate analysis was performed, but this looks like univariate analysis was done and combined into one table.

- See response to comment 3. We have now relabelled Table 4 so that it is clearer.

Reviewer: 2
1. The meaning of “threat of discipline” and “fear or mental health” in the abstract and elsewhere in the paper are unclear.

-These themes have been expanded on in the abstract (page 2-3) and other sections of the manuscript (page 23, 24, 29 and 30).

2. In the abstract, the authors state that “despite current guidelines, diabetes care in mental health settings remains peripheral.” Do the guidelines the authors refer to specifically state that diabetes care should be provided by mental health providers? It seems likely that in the absence of a provider group having clear responsibility for executing a given set of guidelines, guidelines alone are unlikely to improve clinical practice.

- UK NICE guidelines for the management of psychosis and schizophrenia state that specialist mental health teams should assume the role of monitoring service users’ physical health for at least the first 12 months or until the person’s condition has stabilised, thereafter responsibility should be transferred to primary care [NICE. Psychosis and schizophrenia in adults: treatment and management. NICE clinical guideline 178.]. These are referenced on page 6.

3. Page 6, the statement “our previous research indicates a clear demarcation between the perceived responsibilities of mental health versus primary care and specialist diabetes services” would benefit from an indication of directionality. Based on the authors’ prior research, which of these provider groups views themselves as responsible for (which elements of) diabetes care among people with SMI?

- We have now elaborated on the findings of our qualitative study (page 6).

4. Given that the goal of the study is to understand barriers to delivery of diabetes care for people with SMI, why did the study sample include healthcare providers involved in the care of T2DM and/or SMI, rather than TD2M and SMI? What is the value of including providers in the sample who care for people with T2DM, but do not care for people with SMI?

- We recruited healthcare professionals who were involved in the care of T2DM and/or SMI as the focus of the study was diabetes. Although those who care for people with T2DM may not have a specific remit to care for people with SMI, given the prevalence of diabetes in SMI it is likely that a proportion of their clients have an SMI diagnosis.

5. What is the response rate of the survey? 386/100,000 (per the text on page 7 regarding the size of the target population) = <1%? This is extremely low and calls into question whether and how the results can be generalized.

- Unfortunately, due to the online recruitment methods it was not possible to estimate the number of people who were invited to participate. We appreciate that the proportion of people who completed the questionnaire in relation to the target population is small. We have therefore acknowledged this as a further limitation of the study (page 30).

6. The authors have major missing data problems, with complete data for only about 40% of participants. Why was missing data such a problem in this survey? The authors exclude people with more than 50% missing data, but report that all variables measured had some missing data. Given this issue, it is not clear to me that valid conclusions can be drawn from this data.

- The degree of missing data is likely due to online completion of the survey. The research team decided that questions should not be compulsory, in order to gather as much data as possible, however this meant that in some cases large sections of the questionnaire were not completed. Online methods also mean respondents were easily able to log out at any point during the survey, leaving in some cases significant missing data. We did however, feel that this was the better approach as force-response online surveys actually have higher dropout rates than surveys where resoinses are not enforced (Stiger et al 2007). As the data was missing completely at random the analysis of the data is unlikely to bias, only power is impacted (Little et al 2014).

7. Why were general practitioners so underrepresented in the sample? This question relates to my prior questions around sample frame and sample size. It seems that a more targeted, purposive sampling frame designed to yield completed surveys from a pre-set number of physical and mental health providers would have strengthened the authors' ability to answer their research questions. What was the rationale for the sampling strategy used?

- The recruitment strategy did include targeting of GP practices across the UK via 5 Clinical Commissioning Groups. The researcher contacted individual practices with the aim of yielding completed surveys. The Royal Colleges of GPs also shared the survey via social media and via their postal and online newsletters. Despite these attempts only 24 GPs were included in the study. Non-participation of GPs has been identified in the literature as real source of bias and potential threat to validity for primary-care based studies. Research by Hummers-Pradier et al (2008) found that 64% of GPs were not willing to take part in research, now or in the future. Remuneration was an important way to encourage participation, the other barriers to participating included limited time, not valuing or seeing the relevance of the research, a lack of personal involvement in the study and the quality of the researchers. It is likely that these factors played a role in explaining why GPs failed to engage with the study. The sampling strategy was designed to make contact with all registrants from the identified professional groups in order to obtain a more representative sample than might be achieved via targeted recruitment in specific NHS sites.

8. The authors state on page 25 that "Taken together, our findings suggest that a number of strategies could be implemented to improve the care offered to people with diabetes and SMI, and as a consequence address the inequalities experienced by this population. Identification of these barriers and enablers allows us to identify, using established methods, the behavior change techniques that

should be employed within an intervention to improve diabetes care in people with SMI." Which behavior change techniques do the results suggest should be used? What types of interventions do the results suggest might be effective?

- The authors have taken the next step of mapping the theoretical domains found to be important in this study to potential intervention components. The methodology for this has been added to page 9, with the results and subsequent discussion on pages 24-25 and 30, respectively.

We look forward to hearing your views.

Yours sincerely

Dr Hayley McBain
Lecturer in Health Psychology

VERSION 2 – REVIEW

REVIEWER	Douglas Gunzler Case Western Reserve University and USA
REVIEW RETURNED	28-Nov-2017

GENERAL COMMENTS	I commend the authors on a job well done on the revision. I have a couple minor comments that the authors should be able to adequately address without a further review: 1) As per my confusion the first review, it would be helpful to the reader to make very clear throughout the manuscript what is univariate and multivariate analyses. For example, in the abstract stating "multiple regression analyses" rather than just "regression analyses" would make it clear that the results presented are from multivariate analyses. 2) In the sample size estimation, what is the "medium effect size" describe? Is this an R2 value? 3) Since missing data mechanism is an assumption based on the data structure and can't be proven conclusively, I would add "we assumed" to clarify MCAR is an assumption in "Little's MCAR test was non-significant and hence we assumed data was MCAR."

REVIEWER	Beth McGinty Johns Hopkins Bloomberg School of Public Health, USA
REVIEW RETURNED	08-Dec-2017

GENERAL COMMENTS	The authors have revised the manuscript to address my prior concerns.

VERSION 2 – AUTHOR RESPONSE

Reviewer 1

1) 1) As per my confusion the first review, it would be helpful to the reader to make very clear throughout the manuscript what is univariate and multivariate analyses. For example, in the abstract stating "multiple regression analyses" rather than just "regression analyses" would make it clear that the results presented are from multivariate analyses.

- this has been amended throughout the manuscript

2) 2) In the sample size estimation, what is the "medium effect size" describe? Is this an R2 value?

- effect size is f2 and 0.15 is classified as a medium effect size (Faul et al 2008)

3) Since missing data mechanism is an assumption based on the data structure and can't be proven conclusively, I would add "we assumed" to clarify MCAR is an assumption in "Little's MCAR test was non-significant and hence we assumed data was MCAR."

- this has been amended